The
Electrical Review

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An Electrical Ambassador

IT is an unusual event for the electrical industry to appear in the day's Court News. Therefore, prominent reference should be made here to the announcement from St. James's Palace on February 4th that:—

> The Prince of Wales received this morning Mr. Victor Watlington (Chairman of the Council, British Electrical and Allied Manufacturers' Association).

Let us at once welcome this emphatic indication of His Royal Highness's interest in the electrical industry. It is not the first occasion, by any means, on which the Prince has come into close connection with our great, and destined ever to become greater, industry.

The object of Mr. Watlington's visit was to inform His Royal Highness that the B.E.A.M.A., acting in conjunction with the Government, had decided to appoint Mr. H. C. Siddeley, M.I.E.E., to proceed to Buenos Aires next month, and to stay there for three years as an ambassador in the interests of the electrical industry of the United Kingdom.

Familiar as we are with Mr. Siddeley's lengthy electrical trade activities at home, remembering that he was in charge of the B.E.A.M.A. exhibit at the British Empire Trade Exhibition at Buenos Aires a year ago, and knowing that long ago he had some years' practical experience in the conduct of co-operative businesses on behalf of electrical manufacturers of specialised lines, which operations called for discreet handling of differing interests, we feel justified in saying that we should find it extremely difficult to place our hands upon another man so well qualified for this particular piece of work.

Two important articles were contributed to the ELECTRICAL REVIEW in the early winter in which Mr. Siddeley gave evidence of the exceptional knowledge that he possesses qualifying him commercially and technically to represent British joint exporting interests in Argentina.

We refer to "The Electrical Trade and the Crisis" (ELECTRICAL REVIEW, October 16th), in which he advocated a policy of united action amongst our manufacturers in overseas markets; and to "Electrical Trade in Argentina" (ELECTRICAL REVIEW, November 6th), in which he showed the requirements of the market, the great handicap under which we stood owing to the strength of foreign ownership and activity, and the need for big British showrooms—indeed, for an altogether united and ambitious British policy.

The B.E.A.M.A. was wise in making so effective a display at Buenos Aires, and both that organisation and the Overseas Trade Development Council have been wise in making joint arrangements for so good a man to proceed at once, ready for the world-awakening when it shall come, to a trading ground which should afford such abundant scope for British enterprise in spite of foreign activity during the next few years.

Mr. Siddeley, who will have the congratulations and good wishes of everybody electrical, will be representing the Government as well as the B.E.A.M.A. We may, therefore, hope to receive interesting reports from him from time to time.

At Last!

IT is a matter for peculiar satisfaction to the ELECTRICAL REVIEW, which for many years has editorially urged the appointment of Electrical Ambassadors in various overseas markets, to be able to record that *at last* it should have been found practicable for the B.E.A.M.A. and a department of the National Government to co-operate in sending a joint representative to proceed, unhampered by the ordinary manifold duties of a

Trade Commissioner, to fill so responsible an office. Modern conditions, we are told, demand co-operative action in dealing with export markets. Not only modern conditions have called for it. Other years called for it, too—think where we might have been to-day had the idea been adopted elsewhere when it was first urged! Other markets require the same new attention now—who has not marked the persistency of our Toronto correspondent regarding Canada? We hope that the Royal interest, and the Argentine policy, will lead both the Government Department concerned and the B.E.A.M.A. to take steps with regard to other markets.

Electrical Publicity

DURING the last few months a good deal of criticism has appeared in our pages concerning our electrical publicity and propaganda services. Editorially we have pointed out weaknesses; contributors have written articles making suggestions for the education and enheartening of the electricity selling staffs; and various correspondents have added their views. We have encouraged all these things in order that the rate of domestic and industrial development of electricity supply might be accelerated. One of the chief thoughts emerging from these discussions has been about the need for strengthening the British Electrical Development Association financially and in its personnel. We are glad to report that the time and space have not been wasted.

The New Man

AFTER much discussion within its ranks the Association has now appointed Mr. A. Gowans Whyte to the staff of the Director, to be responsible for Press editorial and publicity work, and he will shortly take up his duties. We regard this appointment in two ways. First, it will relieve Mr. A. C. Cramb, the Director and Secretary, of a number of duties which must have exercised his mind more than they should have done since he left Croydon a year ago to take up what we stated then was the highest office of leadership in the industry. Second, his immediate staff is strengthened by the addition of a man who, if he knows anything, knows both the merits of electricity and how to write strongly yet lightly about them, and who also has had valuable propaganda experience with one of the great political parties since he left electrical journalism some years ago.

Only the Beginning!

WE may have more to say about the matter later. But even now, in stating little more than the bare fact, we want to warn electricity supply authorities everywhere that no new appointments at headquarters can relieve them of their responsibility for the progress of their own undertakings. Nor do we wish it to be imagined that we think that the Association need no longer be critically regarded because a suitable man has been appointed for a particular job. We do not ask either Mr. Cramb or Mr. Whyte what changes they jointly hope to introduce which will render the organisation more efficient for leading the industry. Yet we confess we should like to know! The appointment is only the beginning of a new advance. However, we will permit our eagerness for electrical headway to be temporarily content with two such announcements as those of B.E.A.M.A. and B.E.D.A. in one week—indeed we are almost enthusiastic!

The Tramway Load

AT the I.E.E. dinner the Minister of Transport expressed surprise at the complacency with which electrical engineers are accepting the supersession of the tramways by the petrol bus in many towns. We are not in favour, any more than is Mr. Pybus, of bolstering up an obsolete system, but we should like to see more technical justification for the possible loss of some 850 million kWh per annum to the electrical industry—a figure equivalent to 7½ per cent. of the electricity generated in Great Britain last year. "Complacency," indeed, seems to be the right word, for—as Mr. C. J. Spencer has pointed out—we are treating this important question of road transport in far too casual a manner. There are, no doubt, definite fields for the tramcar, the trolley bus, and the petrol bus; the boundaries depend very largely on traffic density, but there is a very obvious lack of co-ordinated data to work upon, and the question of the employment of one or other of the systems appears to depend mainly on such irrelevancies as local politics, fashion, or individual whim.

The Trolley Bus

THE case for the trolley bus as the legitimate successor of the tramcar, where traffic density or local conditions point to the desirability of a change, was set out in an article published by us last week. Mr. Pybus, in the course of his remarks, suggested that special quotations for electric road transport would be justified on account of the benefit of the load to the coalfields and other home industries. That is not to say that the load is not desirable enough in itself to justify special consideration in the way of tariffs, and members of the Institution might well take his hint to assist developments in this direction. But what is to be done must be done quickly. In 1930-31, the number of passengers carried on our tramways fell appreciably, and there was a change-over of several more systems to petrol vehicle operation. Why not have an official inquiry at once by an authoritative body into the conditions under which each type of road transport works best?

And the Railways

IN the present anxiety about economic questions there is a danger that the magnitude of the expenditure involved in complete railway electrification may cause the whole matter to be left in abeyance. We know from our experience with frequency standardisation how costly delays may be. The suggestion of the I.E.E. President that a length of main line not exceeding 200 miles should be electrified, to obtain confirmation of the experts' findings in the Report of the Weir Committee, appears to be quite practicable. One of the sections of the L.M.S. investigated by the consulting engineers was 193 miles in route length. In this case the saving due to electrification (costing about £5 millions) was not pronounced, but a large proportion of steam haulage was assumed to be retained; this dual working will presumably not be permitted in practice, as it was condemned in the Report. The low costs now prevailing would favour Capt. Donaldson's plan. In support of this comes a report of the National Electric Light Association, in which it is pointed out that this factor alone has caused the speeding up of certain railway electrification schemes both in Europe and in America.

Yorkshire Progress

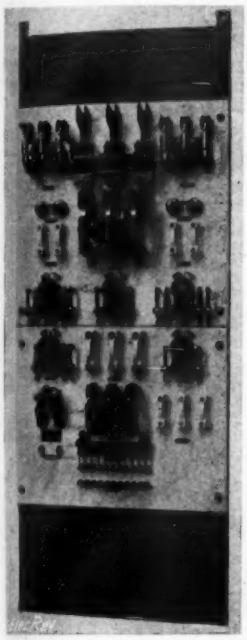
AN advance of £14,359 in its net profit for the year 1931 (to £357,917) is a result of which the Yorkshire Electric Power Company may justly be proud. Units sold increased from 195 millions to approximately 208½ millions. While reduced working expenses and increased net revenue have been brought about by economies in operation, and by greater efficiency, it is especially noteworthy that the continued increase of the use of electricity for domestic purposes accounts for a substantial addition to the sale in bulk to authorised distributors. The Yorkshire Company has very wisely taken enterprising steps to bring the advantages of its area as affording sites for new industries to the attention of overseas manufacturers who, owing to the altered situation of international affairs, are considering the establishment of works here.

All-electric Printing. By R. N. Tweedy

The up-to-date equipment of the *Irish Press*

THE capital of Ireland once more boasts three dailies. Since times became too troubled for the renowned *Freeman's Journal*, only the *Irish Times* (still regarded, but with lessening justification, as the organ of the Unionist minority) and the *Irish Independent* (the Catholic daily) have circulated. Now the official Opposition—Fianna Fail, whose leader is Mr. de Valera—has set up its own distillery to extract the "truth from the news" at the reconstructed Tivoli Theatre of Varieties. This was once the headquarters of Daniel O'Connell, the Liberator, and was then styled Constitution Hall.

To serve its present purpose the old theatre had to be reconstructed almost entirely. Under the direction of Messrs. Crowley and Partners, consulting engineers, the electrical and mechanical equipment of the building is capable of turning out a product of a higher standard than anything yet seen in Ireland.



Hoe press-drive control gear

The electricity supply is taken from a sub-station in the basement, provided and controlled by the Electricity Supply Board. Three-phase 50-cycle 5-kV mains feed the primaries, and the 346-V cables are taken through a fire-proof wall directly into the switch-room of the *Irish Press*.

Light, Power and Heat

The swit hboard was built by Mr. A. G. Bruty, M.I.E.E., who obtained the contract for the wiring. It consists of nineteen units controlling the incoming mains, the stand-by generating plant, and the supply to the printing presses, other motors, lights, metal heating, room heating, and photographic apparatus.

The feeders are all drawn into heavy-gauge solid-drawn conduit. The cables and wires throughout the building are 2,500-megohm C.M.A. manufacture.

There are 66 motors, and 22 outlets for heating in connection with the various processes; in addition, the whole building is heated electrically, mostly by tubular units. Nearly 500 points, equipped for the most part with Benjamin reflecting and diffusing fittings, provide ample and well-distributed light.

The wiring of the composing room has been done in a simple and effective manner, which meets the conditions of large spaces under open-roof work. The light steel channels are attached easily to the trusses, form convenient troughs for the wires, and enable the pendant boxes and other fittings to be fixed before erection. Branching and extensions are carried out on this system with the greatest facility.

The Hoe Press Drives

The electrical installation for driving the Hoe sextuple double-width presses consists of a.c. commutator duplex motor equipments manufactured by Messrs. J. H. Holmes & Co., Ltd. The main motors give an output of 85 h.p., with a speed range of 910 to 400 r.p.m. The driving equipments and their control gear are fully automatic, with push-button control, and are designed to ensure the safety of the press operators.

The complete equipment consists of a main motor, a 15 h.p. auxiliary motor, and a controller driven by a pilot motor. The auxiliary motor drives through the main motor shaft for starting and inching, but is thrown out of action by an automatic relative movement clutch when the main motor takes over the drive. The speed of the auxiliary motor is reduced by a worm reduction gear to give suitable speeds at the press for inching and leading in of paper web.

The complete operation of the press is from a pedestal control station at the folder having "starting," "inching," "speed up," "speed down," "stop," and "safe" push-buttons, together with signal lights and a warning button. Additional semi-control push-button boxes with "inching," "stopping," and "safe" push-buttons are provided on the various units or decks. Signal lights are also provided to indicate to the operators when the press is safe to work upon.

The operation of any "inch" push-button will cause the press to be driven by the auxiliary motor at a suitable leading-in speed. Operation of the "starting" and "speed-up" button starts the press at the inching speed, and the continued depression of this button gives a gradual increase of speed up to any desired steady value.

The correct sequence of operation is obtained from the pilot motor-driven controller which is also coupled to the brush-rocking gear of the main motor to regulate the speed.

With the a.c. series commutator motor suitable adjustment of the brush position enables the starting torque and current of the main motor to be varied to suit the local conditions so as to secure a smooth change-over from the auxiliary to the main motor, and, after that, a gradual and uniform increase in speed for printing, eliminating risk of web breakage.

The commutator motor also gives high efficiency and power factor over a range of printing speeds.

Two of these presses are installed at present, and a third is expected to be installed shortly for the production of an evening paper. The reels of paper are hoisted by a 3-h.p. motor, gear-driven and controlled by push-buttons and limit switches.

The foundry contains auto-plate machines, auto-shavers, &c., all electrically operated by push-buttons and electrically heated where required.

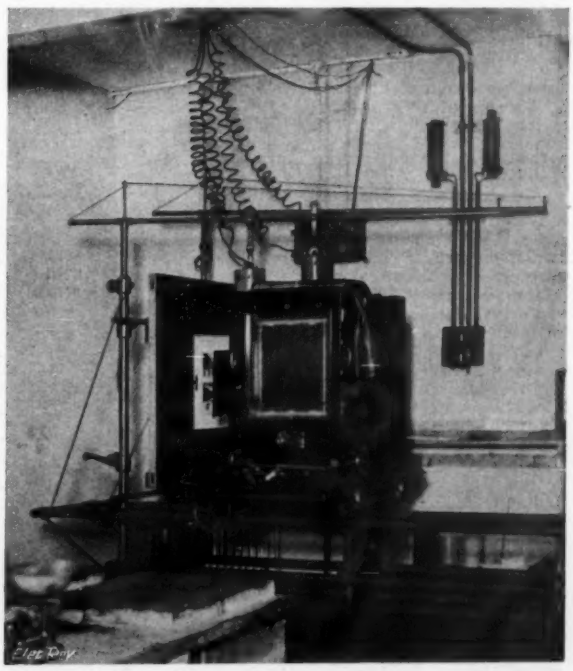
Type-casting by Electricity

In the composing room the Intertype machines are driven by individual motors, as are the machines in the process department.

In view of the long period during which gas has been used for melting the type metal, it is particularly interesting to note that the *Irish Press* decided on merit to use electricity for this purpose.

The sharpness and solidity of the type depend very largely on the casting temperature, and the continuously accurate control of this can be ensured by the use of thermostatically controlled electrically heated melting pots.

The running costs of the "Electro-Funditor" melters compare very favourably with those of gas, but the additional



Photographic process room

advantages outweigh any question of cost. With electricity at 1d. per kWh the cost of running an Intertype machine is about ¼d. per hour, which can be reduced by heat-insulating the pot, but, if that is done, gas cannot be used as a stand-by.

When gas is used as the only source of heat the Home Office in England and the equivalent Government Department in the I.F.S. require fume hoods to be fitted close down to the machine and flues to be carried into the outer air; all this expensive and unsightly lumber is eliminated when using electrically heated pots.

D

The metal is heated by arch-shaped elements enclosed in steel pockets immersed in the metal, three elements being used in the standard pots and four in the larger size. In order to overcome the trouble which has been associated with the throat and mouth of all metal casters, the mouthpiece is heated by a curved element enclosed in an aluminium casing covered by a flexible chrome-nickel plate.

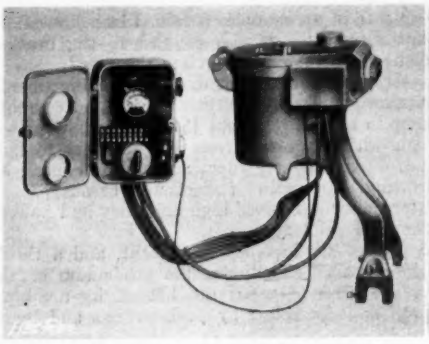
In it four resistances are inserted, providing five temperature steps. Thus, the heat emitted by the resistances, usually wasted, is used to heat the back of the throat. A hollow spiral in a regulating box expands or contracts in sympathy with the temperature of the metal and actuates a rod connected to a lever controlling a tilting glass tube which contains mercury and two contacts.

For Intertype and Linotype machines the working temperature range is between 500 deg. F. and 570 deg. F., while for the Monotype heater the range is from 570 deg. F. to 840 deg. F.

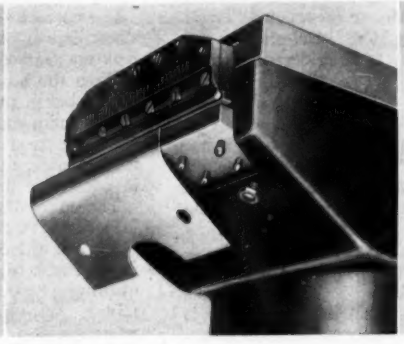
The effect of this control is that, when the temperature of the metal rises 3 deg. F. above the level desired, current is cut off automatically until the temperature falls 3 deg. F. below the level. The throat and mouthpiece elements are not included in this control, as the temperature of the outlets must be independent of the temperature of the type metal.

The maximum load when heating up is 1,200 W on the standard pots and 1,500 W on the larger pots. The time required to bring the metal from cold to working temperature is from 1 to 1¼ hours, and a time-switch to operate from 1 to 2½ heaters can be installed to ensure that the compositors shall have everything ready to start work when they come on duty.

Mr. S. McEntee, T.D., acted as resident engineer for Messrs. Crowley and Partners.



Linotype assembly connected to regulator



Splash plate in mouthpiece prevents metal reaching element

"Electro-Funditor," showing asbestos plate between jacket and element frame

"Electro-Funditor" type-metal melting equipment

Mr. Siddeley's Appointment

Joint action by B.E.A.M.A. and the Government

IN connection with the appointment of Mr. H. C. Siddeley to the Argentine, with Buenos Aires as his headquarters, which forms the subject of our leading article to-day, there are several significant points which merit attention.

The appointment has the active support of the British Government, and if, as may well be assumed, this means financial support, it constitutes a new departure in State aid for overseas trade, and one which many of our industries will cordially welcome. So far as we can recall it is the first time that a Government subsidy has been paid in respect of an unofficial representative of a particular branch of industry in a particular market.

The adoption of the new principle of joint representation in Buenos Aires shows that a real impression has at last been made in official and commercial circles alike by the advice that in order to succeed in the present international scramble for business the utmost economy and efficiency must be observed. Probably the present development will cause the abandonment of the wasteful methods of pre-War days when in connection with a big prospective overseas contract half a dozen British firms found it desirable to incur the expense not only of sending highly salaried men to do the preliminary spade-work and collect the data for tendering, but also to keep their respective technical representatives for a long period on the spot in order to nurse the business.

Under the new arrangement there will be in Buenos Aires a commercial and technical representative able to furnish at short notice every detail required by the prospective purchaser. Considerable time and expense will thus be saved in submitting quotations and tenders, to the advantage of both contractor and buyer alike.

Mr. H. C. Siddeley, who is to act as ambassador of the electrical industry in Buenos Aires, is well known to readers of the "Electrical Review" by reason of his recent articles on Anglo-Argentine electrical trade

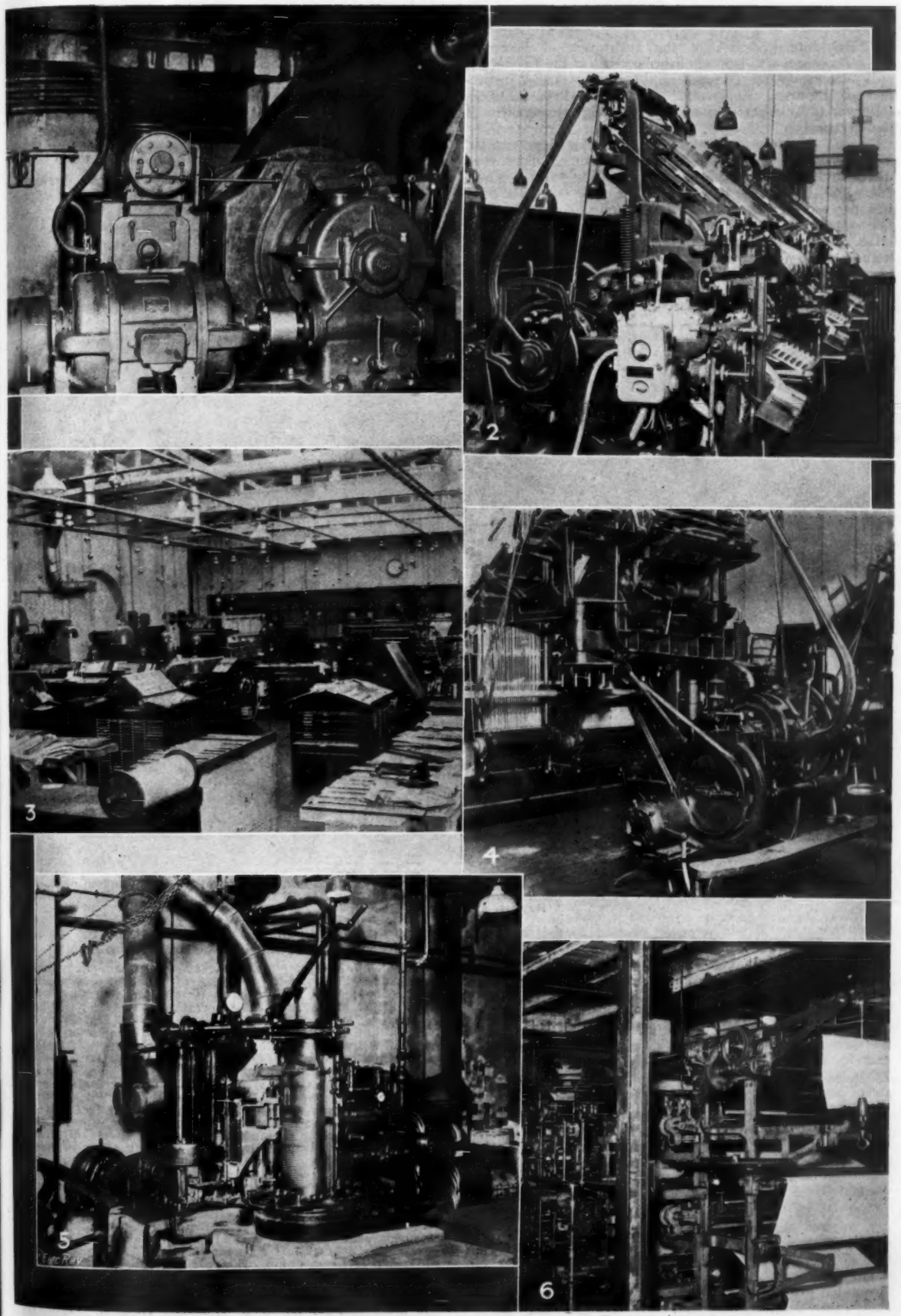
Mr. H. C. Siddeley, who is to fill this important post, is peculiarly well fitted for the work. He has been associated with the B.E.A.M.A. almost since its establishment and has had considerable experience as an administrator of co-operative effort in export trade.

Mr. Siddeley will act in a consultative and liaison capacity in directions likely to assist the interests of British electrical manufacturers, and with a view to augmenting the efforts made through existing channels by British firms. His principal functions will be to maintain contact with Government departments, public utility companies, railway companies, engineering institutions, &c., and between agents and representatives of the manufacturers, in order to facilitate consultation when required with the direction and control of the Committee at home, and, with the recognition and support of the Department of Overseas Trade, he will possess a status which will materially forward the purposes for which the appointment is made.

Argentina has been a valuable market in the past. Our exports of electrical machinery and apparatus have been worth between £1,000,000 and £1,500,000 in recent years. The country contains outstanding examples of the high quality and efficiency of British power station machinery, railway and tramway material and port equipment. In the future Great Britain should find there an expanding market, but an effort such as is to be now made is most certainly long overdue. If it had happened earlier it might have enabled British electrical finance and industry to defeat foreign efforts which are bearing fruit to-day.

Argentine imports of dynamos and motors in 1930 (the latest year for which detailed figures are available) amounted to 5,663 tons, as compared with 5,150 tons in 1929 and 4,933 tons in 1928. The tariff values of these imports were respectively £543,700, £494,000 and £473,000. Over the same period imports of fan motors rose from 22 tons to 37 tons in weight and from £55,000 to £94,000 in tariff value. Of the above total (5,663 tons) of heavier plant Germany's share in 1930 was 2,782 tons, Great Britain's 723 tons, and the United States' 573 tons (against 746 tons in 1928). The United States and Italy were the principal suppliers of fan motors.

A glance at the statistics of imports of apparatus and appliances shows that the British share has been poor compared with those of the United States and the Continental countries. For example, of a total of £290,000 representing the tariff values of radio material imported in 1930, no less than £186,000 was from the United States and £47,000 from Holland, Great Britain's share being but £13,000.



Some views of the plant installed in the "Irish Press" establishment, Dublin. (*See pages* 219 *and* 220.)

1. Power unit of one of the presses. 2. "Intertype" machine, showing electrically heated metal melter. 3. The well-lighted composing room. 4. An "Intertype" drive. 5. Plate-casting plant. 6. One of the Hoe presses.

The I.E.E. Dinner

Mr. Pybus and railless traction

THE annual dinner of the Institution of Electrical Engineers was held on February 4th at the Connaught Rooms, W.C.2. Proposing the toast of the "Institution of Electrical Engineers," Mr. P. J. Pybus, C.B.E. (Minister of Transport), referred to his long connection with the electrical industry.

He said that it was gratifying to note that Great Britain alone among all industrial countries consumed more electricity in 1931 than in the previous year (by 4.5 per cent.). Since 1927 the increase had been 35 per cent., compared with 15.3 per cent. in the United States and 18.5 per cent. in Germany.

He wondered whether the sudden change over from the tramcar to the oil-driven vehicle had not gone too fast and too far. When a change was desirable the substitution of the trolley 'bus, where the route made it suitable, would help home industries and particularly the coalfields. Electricity supply engineers should consider quoting special terms for the retention of this very desirable load.

He announced the reappointment of Mr. Whigham and Lord Barnby as members of the Central Electricity Board. During 1931 the Board had constructed 1,495 miles of lines, bringing the total to 2,310, and leaving 1,658 miles outstanding. It was anticipated that the grid would be completed in the early spring of next year. Wayleaves were secured last year for 1,709 miles of overhead line, and there were only 500 miles remaining unsettled; out of nearly 10,000 consents given, compulsory powers were required in only 233 cases.

The total value of contracts let up to December 31st was nearly £22,000,000, or, including frequency standardisation, nearly £30,000,000. By expediting its work, the C.E.B. had given supplies which had so far saved an expenditure of £2,250,000 on generating plant. The next task for engineers would lie in extending low-voltage distribution facilities.

Capt. J. M. Donaldson, M.C. (President, I.E.E.), responding, referred to the ancestry of the Institution and its connection with civil and mechanical engineering. He hoped that electricity might prove the salvation of the railways, but something must be done quickly. Conditions were more favourable to railway electrification in Great Britain than in many other countries.

He suggested that up to 200 miles of main line, with mineral as well as passenger traffic, should be electrified with a view to obtaining further data as to (1) flexibility, (2) saving in labour, (3) maintenance costs, and (4) reduction in charges on idle capital.

He hoped that the consumption of electricity would be at least doubled within the next five years and that many more telephones and wireless sets would be used. The motto of electrical engineers should be "Electricity in the service of man."

The health of "Our Guests" was proposed by Lt.-Col. K. Edgcumbe (past-president), who referred to the work of the committee appointed by the Institution for considering the position of members abroad. Suggestions from any such members would be welcomed.

The toast was responded to by Messrs. I. Ulrich (president, Société Française des Electriciens), M. H. Damme (president, Koninklijk Instituut van Ingenieurs), and H. T. Tizard, C.B.E., F.R.S. (Rector, Imperial College of Science and Technology).

The dinner was followed by the usual reunion. Although the number present was slightly less than 700, one had the impression that every member was there and at the top of his form.

A photograph taken by the ELECTRICAL REVIEW at the dinner. Our readers will recognise a number of well-known electrical men, including the President, Mr. V. Watlington, Mr. Johnstone Wright, Sir Arnold Gridley, Mr. John Christie, Dr. E. H. Rayner, and Mr. H. Hobson

In addition to those already mentioned, the following gentlemen supported the President at the top table:—

Prof. G. T. Morgan (*President, Society of Chemical Industry*); Mr. John Brass (*Acting President, Institution of Mining Engineers*); Mr. V. Watlington (*Chairman, British Electrical and Allied Manufacturers' Association*); Sir Frank E. Smith (*Secretary, Royal Society*); Dr. W. H. Eccles (*Past President*); Mr. L. Simon (*Director of Telegraphs and Telephones, G.P.O.*); Sir J. R. Brooke (*Vice-Chairman, Electricity Commission*); Mr. R. A. Chattock (*Past President*); Sir Edward A. Gait (*Chairman of Council, Royal Society of Arts*); Mr. W. B. Woodhouse (*Past President*); Sir Cyril W. Hurcomb (*Permanent Secretary, Ministry of Transport*); Dr. A. Russell (*Past President*); Sir Robert Robertson (*Government Chemist*); Mr. C. C. Paterson (*Past President*); Mr. Ernest Sanger (*Chairman, London County Council*); Sir Francis Goodenough (*President, Illuminating Engineering Society*); Mr. R. T. Smith (*Past President*); Sir William Bragg (*Fullerian Professor of Chemistry, Royal Institution*); Mr. W. M. Mordey (*Past President*); Mr. J. W. Dulanty (*High Commissioner for the Irish Free State*); Sir B. N. Mitra (*High Commissioner for India*); Sir Murdoch MacDonald (*Vice-President, Institution of Civil Engineers*); Mr. Ll. B. Atkinson (*President, British Electrical Development Association*); Lieut.-Col. A. P. Heneage (*Parliamentary Private Secretary, Ministry of Transport*); Mr. C. P. Sparks (*Past President*); Lieut.-Col. E. Kitson Clark (*President, Institution of Mechanical Engineers*); Sir Joseph E. Petavel (*Director, National Physical Laboratory*); Col. Sir Thomas F. Purves (*Engineer-in-Chief, G.P.O.*); Rev. E. St. G. Schomberg (*Mayor of Westminster*); Mr. J. S. Highfield (*Past President*); Mr. W. Craig Henderson, K.C.; Mr. F. Pick (*President, Institute of Transport*); Mr. Frank Hodges; Sir Archibald Page (*Past President*); Dr. T. Watts Eden (*President, Royal Society of Medicine*); Mr. W. Pellew-Harvey (*President, Institute of Mining and Metallurgy*); Dr. G. C. Clayton (*President, Institute of Chemistry*); Mr. B. Welbourn (*Vice-President*); Mr. H. L. H. Hill (*President, Institute of Chartered Accountants*); Mr. Maurice F. G. Wilson (*Chairman, British Standards Institution*).

Steam Generation. By F. Nicholls, A.M.I.E.E.

The results of increased boiler output from a given space

THE modernised boiler-house at Derby Corporation generating station was the first in this country to be designed from its inception for operation with pulverised fuel. The first two of the new boilers, with air-cooled combustion chambers, commenced steaming in 1925-26. In 1927 a further unit was added incorporating Murray bare-tube walls. Experience gained from the latter led to the installation of radiant heat boilers with completely water-cooled furnaces.

The original boiler plant consisted of six Lancashire boilers with a total capacity of 42,000 lb. of steam per hour at 120 lb. per sq. in. The pulverised fuel boiler-house, now occupying the same site, contains five boilers evaporating a total of 400,000 lb. per hour (m.c.r.) with steam conditions of 300 lb. per sq. in. and 750 deg. F.

The advance indicated in fig. 1 has been possible only through the increased efficiency of boiler heating surface shown in fig. 2. The influence of radiant heating surface is clearly indicated by the remarkable rise in the curve corresponding to the recent additions, which give more than 25 lb. of steam per sq. ft. of total boiler heating surface. A definite limit has already been reached at which the total temperature has been raised to the critical temperature of the present known steel and steel alloys from which superheaters are manufactured.

Convection-type superheaters are not generally in a hot enough zone. Probably, therefore, radiant superheaters, of which there are already a few examples, will form an essential part of the high-pressure, high-temperature boiler of the future. From thermo-dynamic considerations, superheat and reheat must be looked to for increased overall efficiencies. The influence of total heat rendered available by (*a*) increasing pressure, and (*b*) increasing pressure and superheat is shown graphically in fig. 3.

Capacities and Floor Space

The principal factors influencing the capacities of boilers are reliability and facilities for construction. The tenfold increase

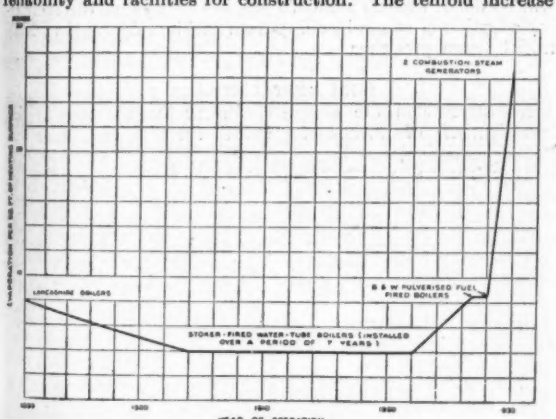

2 COMBUSTION STEAM GENERATORS
LANCASHIRE BOILERS
B & W PULVERISED FUEL FIRED BOILERS
STOKER-FIRED WATER-TUBE BOILERS (INSTALLED OVER A PERIOD OF 7 YEARS)
YEAR OF OPERATION

Fig. 1.—Progress of heating-surface efficiency

in the intensity of steam generation from unit floor space during the past thirty years could not have been achieved solely by increasing unit output as reliability improved. The chief influence has been in the improvement of efficiency in each component part of the boiler, *viz.*, firing equipment, furnace, heating surface, and steam storage.

The increasing use of radiant heating surface, following the introduction of water cooling for furnace protection, has considerably improved the average rate of heat transfer throughout the unit. In other words, increased capacity has been secured by merely rearranging the heating surface, while the incorporation of water cooling in furnace design which is now common practice gives still further capacity with no increase in the dimensions of the boiler itself.

Higher furnace ratings and temperatures have also contributed to the reduction in weight and volume for a given capacity by increasing the rate of heat transfer. The most important factor, however, has been the introduction of pulverised-fuel firing, and the impetus which its immediate success has given to the improvement of mechanical stokers.

Furnace Design

In the United States capacities are far in excess of those obtaining here owing to the differing conditions, especially in urban areas. The intensity of demand for electricity and steam, coupled with the restricted and costly ground space in such cities as New York, has necessitated a very high steam output in relation to floor area. A large number of boilers ranging from 400,000 to 1,000,000 lb. in evaporative capacity have been installed of late years, mainly fired by pulverised fuel.

The furnace required for pulverised-fuel firing differs considerably from that suitable for mechanical stokers, and early types were made very large to allow for delayed combustion, and consequently for a long flame travel.

[Lafayette

Mr. F. Nicholls is engineer and manager of the Derby Corporation electricity undertaking

While opinions differ as to the manner of cooling furnace walls by water tubes, the principle has become accepted in practice for p.f. boilers, and is spreading rapidly to stoker-fired boilers. Water cooling has a three-fold effect in relation to furnace design by (1) protecting or eliminating refractories; (2) enabling higher temperatures to be carried for longer periods without increasing furnace maintenance or radiation losses, and (3) absorbing heat as generated and so permitting a higher intensity of heat release, *i.e.*, furnace rating.

The last two effects have an important bearing on increasing capacities. In order to realise their full advantages the design of combustion equipment, especially stokers, has been improved. More efficient combustion, with reduced excess air, is necessary to obtain higher temperatures. Increased rates of combustion are also required to allow higher furnace ratings for pulverised fuel.

Higher Temperatures

As an indication of the increase in furnace temperatures, it may be said that readings of 14 per cent. to 15 per cent. CO_2 at boiler exits are now regularly obtained with stoker firing, while practically no excess air whatever is permitted in many p.f. installations. The general practice of pre-heating part, or all, of the combustion air also has a very definite influence.

Broadly speaking, the trend of design of p.f. furnaces has been towards the total elimination of refractories and the continual increase of temperatures and ratings.

The present tendency in stoker firing is towards simplification of design. In a number of recent installations arches have been omitted entirely, except in so far as they have been necessary to support the superimposed furnace walls. The evaporative capacities in lb. per sq. ft. per hour of various types of steam generators are: vertical bent-tube, 7; bent-tube, with water-cooled side and rear walls, 9.5; bent-tube with completely water-cooled combustion chamber, 27; and radiant heat, 30.

Water cooling, either by means of bare tubes or by any of the usual methods of screening the water tubes with refractory

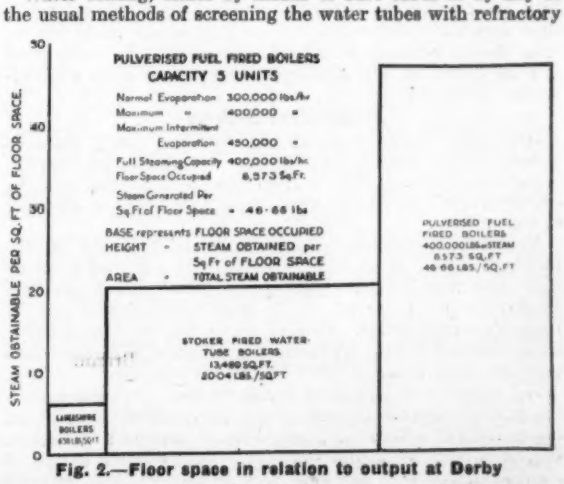

PULVERISED FUEL FIRED BOILERS
CAPACITY 5 UNITS
Normal Evaporation 300,000 lbs/Hr
Maximum " 400,000 "
Maximum Intermittent Evaporation 450,000 "
Full Steaming Capacity 400,000 lbs/hr.
Floor Space Occupied 8,573 Sq.Ft.
Steam Generated Per Sq.Ft of Floor Space = 46·66 lbs
BASE represents FLOOR SPACE OCCUPIED
HEIGHT = STEAM OBTAINED per Sq.Ft of FLOOR SPACE
AREA = TOTAL STEAM OBTAINABLE
STOKER FIRED WATER-TUBE BOILERS 13,480 SQ.FT. 200·4 LBS./SQ.FT
LANCASHIRE BOILERS
PULVERISED FUEL FIRED BOILERS 400,000 LBS. STEAM 8,573 SQ.FT 46·66 LBS./SQ.FT
STEAM OBTAINABLE PER SQ.FT OF FLOOR SPACE.
0
10
20
30
40
50

Fig. 2.—Floor space in relation to output at Derby

or metal blocks, is a feature of practically every modern combustion chamber, the cooling system being incorporated generally as a definite part of the boiler circulating system. The

completely water-cooled furnace is now well established in p.f. practice, and has had a greater influence than any other single factor in bringing steam generation to its present stage.

Influence of the P.F. System

It may reasonably be contended that the advances of the past decade are attributable to the advent on a commercial scale of the p.f. system.

Both "unit," or "direct" firing, and the "central" or "storage" system, have now proved their claims in their respective fields. For the moment the direct-firing system seems to be more widely favoured, but this tendency is probably dictated by considerations of prime cost.

The alternative arrangement of mills associated with individual boilers, but with storage bins and transport system interposed, possesses advantages which will have a great influence in determining future developments.

There has been little need for radical changes in the design

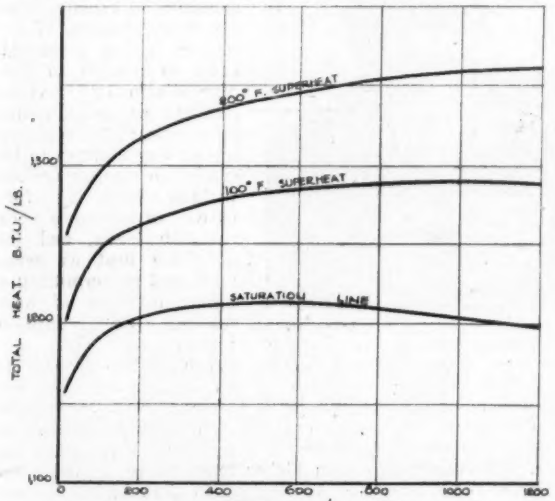


Fig. 3.—Total heat, pressures and temperatures

of pulverising equipment. The original designs can be readily adapted to meet developments for some time to come.

The principal advance has been in the design of burners, and in relation to furnace construction. Turbulent burners will continue to be used for boilers of small evaporative capacity, but the principle of inducing turbulence into the furnace itself, thereby utilising every square foot of radiant heating surface and reducing burner design to its simplest form, is undoubtedly the system on which large scale developments will be based. By this means practice approaches so closely to theory that there appears to be little room either for further improvements or alternative means for securing efficient combustion.

The radiant-heat boiler, allied with pulverised-fuel firing in a turbulent furnace, fulfils the essentials of continuously high efficiency, flexibility, and low maintenance cost.

There is a tendency nowadays to design large power stations or extensions with a proportion of stoker-fired boilers for base-load purposes, the balance being pulverised-fuel fired to meet peak loads. The duplication of much of the auxiliary equipment and the maintenance of two boiler-house staffs has no very obvious advantages, as p.f. boilers may be constructed of such capacities and efficiency ranges as to meet all commercial demands.

Mechanical Stokers

The necessity for providing for capacities many times in excess of those ruling ten years ago has raised the question of furnace design, as distinct from mere construction, and due consideration is now being given to such problems as intensity of heat release.

An ample combustion chamber must be provided for the thorough mixing of air and the products of combustion before these pass into the boiler passages, so as to permit increased combustion rates per sq. ft. of grate area without risk of incomplete combustion. Further, excess air has been progressively reduced with a corresponding increase in furnace temperature, heat transfer, and evaporative capacity.

The scientific treatment of furnace design has consequently contributed towards the solution of the problem of increased capacities, but only by imposing heavier duties on the stoker. Increased combustion rates call for a more efficient system of air distribution with more effective control, which is provided on modern travelling-grate stokers.

The heat-retaining properties of the huge masses of metal necessary to give structural strength have introduced questions of cooling which, if not dealt with, tend to increase maintenance cost unduly. Efficient lubrication becomes increasingly difficult with larger stokers. Expansion difficulties are more apparent, and air distribution and control is rendered more complex. Such progress as has been made has, however, increased the breakdown hazard.

It is now possible to construct travelling-grate stokers up to a limit of 750 sq. ft. in area, and capable of burning coal at rates up to 50 to 60 lb. per sq. ft. per hour, suitable for a boiler of 300,000 lb. per hour capacity. Water-cooled furnaces are essential with modern stokers on account of the temperatures experienced.

The increasing practice of introducing secondary air to the zone of maximum combustion intensity to ensure the conversion of CO to CO_2 is to some extent based upon the same theory as is the turbulent pulverised-fuel furnace. The effects also are comparable in that they enable excess air to be reduced, with a corresponding gain in furnace temperature and rate of heat transfer.

Feed-water Treatment

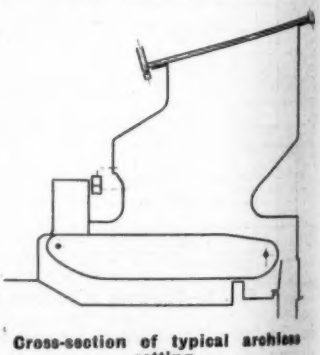
The increased evaporative ratings, particularly with the extended use of radiant-heating surface, make it essential that the feed-water supply should be absolutely pure. The accelerated circulation and high rate of heat transfer calls for absolutely clean tube surfaces, as a scale thickness of even 1/64th of an inch may lead to failure. Present-day practice is almost invariably based on a regenerative cycle, which ensures purity in the bulk of feed-water supply so long as circulating water cannot leak into it.

A certain percentage of make-up water is necessary, which should be obtained by evaporation. The method commonly employed is to utilise steam bled from the turbines, but where such a provision is not made an evaporating plant should be installed. Failing either of these systems, an efficient feed-water purifying and softening plant is essential, and the proportion of reagents introduced should be frequently checked to avoid any possibility of feed-water contamination.

Probably the ideal arrangement is the use of softening plant for initial treatment followed by distillation, and such will no doubt become standard practice in view of the increasing adoption of steam bleeding from turbines operated at high initial steam pressures.

Coal Characteristics

The increase in the cost of coal after the War led to the investigation of means to effect further economies in steam production, and is therefore in part responsible for the developments reviewed.



Cross-section of typical archless setting

Previously steam coals were supplied from sources which experience had shown to be suitable for the type of combustion equipment installed. High cost and high transport rates led to consideration being given to the use of coals of lower grades and from alternative sources. It became an economic necessity to persevere with coals which did not at first give favourable results, and means were devised for burning what had until then been looked upon as "difficult" coals.

The use of preheated air, in conjunction with accelerated combustion and increased furnace temperatures, reacted on chain grates and raised temperatures to a point at which clinker trouble was becoming serious, through partial fusion of ash.

Such coals are not now rejected as unsuitable; but in spite of the wider scope provided by pulverised-fuel firing, there are limits to the capabilities of any given combination of equipment. Trouble may be experienced with coal having certain extreme characteristics in the way of low fusion point of ash, abrasive qualities (*e.g.*, anthracite), a high proportion of abrasive ash, and low volatility.

By experience and research a much wider knowledge of coal characteristics has been acquired not only by experts in this field but by engineers generally. The benefits of this more widespread interest will be manifested not only in general improvement in operating efficiency of boiler plants, large and small, but, through the diversion of the demand for coal to a much wider area, will encourage revival in many sections of the coal industry. In particular the adaptability of the p.f. system to low-grade fuels will solve the serious problem of the disposal of what would be otherwise waste products.

Ships' Gyro Stabilisers. By Gordon S. Mitchell

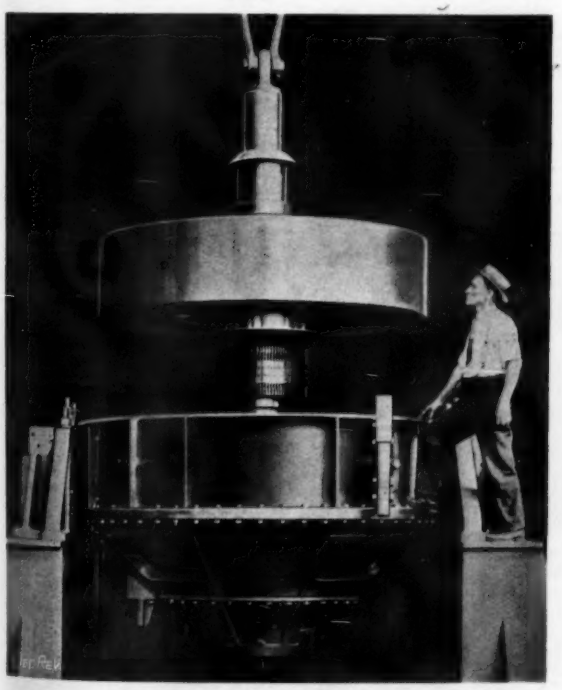
A means of easing control and increasing speed

THE rolling motion of a ship which is induced by wave force is governed, so far as amplitude is concerned, by the character of the wave, although the period of oscillation is entirely independent of the wave itself, it being influenced by the physical characteristics of the ship. A small boat will possess a rolling period of an order of magnitude of four seconds, while a large ocean-going vessel will possess a period ranging up to twenty-five seconds. Wave period, or the time interval between two crests referred to a fixed point upon the surface of the water, may be six seconds in a moderate storm, although in a calm sea it may be as great as twenty-four seconds.

Attempts have been made from time to time to perfect a device to diminish the rolling motion of a ship. The three methods which have proved to be commercially feasible are, in the order of their effectiveness: the bilge keel, the anti-rolling tank, and the gyroscopic stabiliser, the last-named being the most effective.

In its simplest form, the gyroscope is a wheel mounted on an axle, which in turn is supported on a pivot. When the wheel is set in rotation and the axle is supported at its centre of gravity, a moment of force will be exerted on it by gravity and hence no precession will take place, *e.g.*, the axis will point in a fixed direction in space. If, however, an external agent exerts a moment of force at right angles to the axis of rotation, precession takes place and the gyroscope then exerts an equal and opposite reactive moment on the external agent. As a result of this dynamic action of the stabiliser, the precession of the flywheel will develop a torque about an axis perpendicular to the flywheel shaft and perpendicular to the axis about which that precession takes place. This developed torque is proportional to the angular velocity of precession, assuming constant speed of rotation of the flywheel. Precession is obtained by driving the wheel with a direct-current motor geared to the gyro housing.

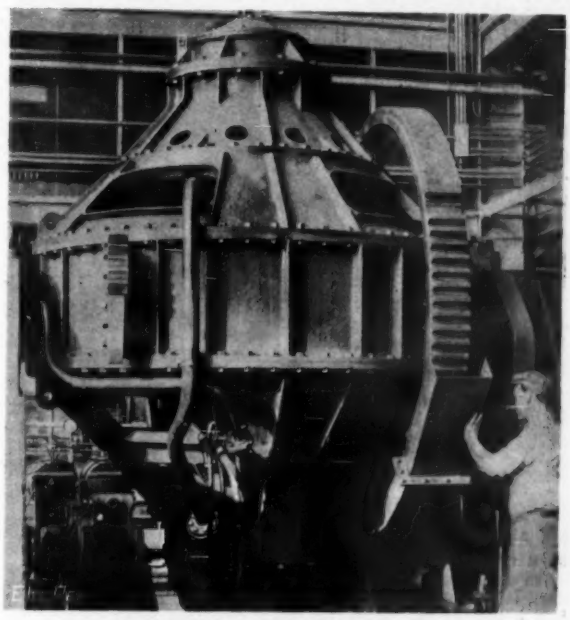
Gyro stabilisers have been installed in all sizes of ships, from a small 60-ft. yacht to a 500-ft., 10,000-ton aeroplane carrier, and are operating with satisfaction. In addition to the obviously increased comfort of passengers travelling on a stabilised



Assembling the rotor of the "Pigafetta" stabiliser

ship, the absence of rolling motion tends to increase greatly the ease of steering and control, as well to increase the ship's speed during rough weather. By operating the gyro at reduced speed, the vessel may be made to roll up to five degrees for lending assistance when pulling off of sand banks or submerged obstacles.

The gyro action may be compared with that of gently lifting a weight from one side of the vessel and placing it on the other, although the stabiliser acts through pure torque without any actual shifting of weight. The stabiliser operates as the result of the motion of a small sensitive control gyroscope, which consists of a rotor spinning in much the same manner as the stabiliser proper. By precessing slightly at the first roll of the ship, the control gyro closes an electrical circuit which operates the main precession motor that is geared to the stabiliser in such a manner as to tilt the machine either forward or aft, depending upon the direction of the roll of the ship. The motor functions to overcome the inertia and friction of the large gyro, making it respond instantly to any wave motion. After being set in motion by the motor



Stabiliser for installation in a yacht

the stabiliser continues to precess until the energy of the wave has been dissipated. As the wave passes beneath the vessel the control gyro precesses in the opposite direction, closing another electrical circuit, reversing the motor and gyro to counteract the reverse forces. The control gyro is extremely sensitive, actuating less than one quarter second after the roll impulse is transmitted to the vessel's keel. It is this instantaneous application which prevents the ship from building up any appreciable roll in synchronism with the waves.

A large gyro stabiliser was recently built for the Italian destroyer *Pigafetta*. The rotor is a carbon steel forging having a tensile strength of 84,500 lb. per sq. in., with an outside diameter of 7 ft. 7 in. A 100-h.p. electric motor mounted on the end of the shaft spins the rotor. Shop tests have shown that 78.3 h.p. is actually expended in spinning the rotor. The weight of the rotating element is 38,800 lb. and its maximum speed is 1,350 r.p.m.

The small control gyro operates at a speed of 6,000 r.p.m. It is provided with a moving contact hung between two stationary contacts and actuated by the roll of the ship.

Upon reaching full speed the motor generates energy (due to initial unstabilised rolling) which is returned to the generator, whose overloading is prevented by a power-limiting relay throwing a braking resistor into the circuit to absorb all the excess. Upon complete stabilisation of the ship after a few cycles, overloading ceases and the relay becomes inoperative. At the end of the ship-rolling cycle the control gyro contact returns to the neutral position, causing coils to de-energise the precession motor and contactors to apply mechanical brakes, bringing it to a dead stop.

Precession of the gyro stabiliser is limited to an angle of 60 deg. on either side of the vertical by means of limit switches in the control circuit. To provide an additional safety factor, mechanical bumpers set at 72 deg. are installed. Should the gyro housing strike these bumpers, it will be latched in position and must be released manually.

A Welded Bridge

An unusual bridge has been erected by Sir William Arrol & Co., Ltd., Glasgow, over the river Gryfe in Renfrewshire. Its outstanding feature is that the flange plates, web plates, and stiffeners of the main girders are welded together by the electric arc process instead of riveting. The bridge is said to be the first application of electric arc welding in Great Britain to road bridge construction.

Research and Construction

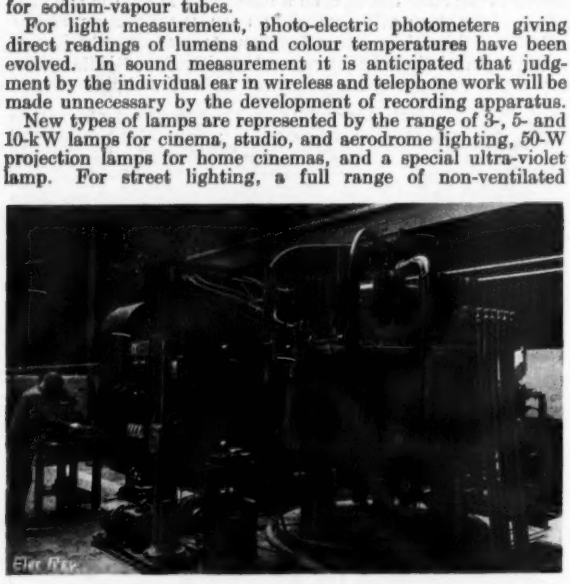
Recent activities of the G.E.C.

IMPORTANT developments are taking place at the research laboratories of the General Electric Co., Ltd., at Wembley.

Among these is the more ready production of the ripple effect in discharge tubes in which orange, blue, and green colours are obtainable; special glasses are being manufactured for sodium-vapour tubes.

For light measurement, photo-electric photometers giving direct readings of lumens and colour temperatures have been evolved. In sound measurement it is anticipated that judgment by the individual ear in wireless and telephone work will be made unnecessary by the development of recording apparatus.

New types of lamps are represented by the range of 3-, 5- and 10-kW lamps for cinema, studio, and aerodrome lighting, 50-W projection lamps for home cinemas, and a special ultra-violet lamp. For street lighting, a full range of non-ventilated



A 2,000-kW 650-V rectifier on test

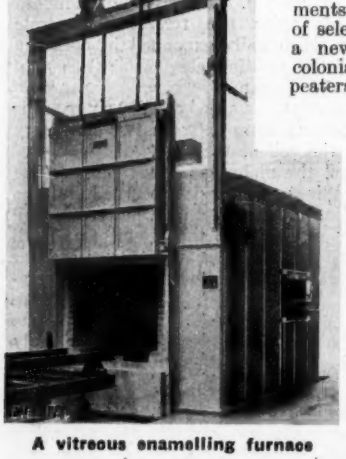
lanterns of the "Wembley" type for 60- to 1,500-W lamps has been completed.

At the Fraser and Chalmers works of the company valuable data is being obtained regarding vibrations in turbine wheels and blades in the newly equipped vibration laboratory.

Detail improvements in accessories are being effected, and there is a marked tendency to increase the use of "Bakelite." The recently introduced rapid-break and easy-wiring switches of the "Silent Landor" and the "Deeble" type are examples of new developments in installation components.

Communications and Heating

Progress is being made with the new 10,000-line automatic telephone exchange at Kensington. Other developments are the special underground lines for the B.B.C., a speech transmission system for the London Underground Railways, and a new telephone trunk system for the G.P.O., giving trunk calls "on demand." Improvements are in hand in the design of selective receivers, including a new short-wave model for colonial use. Thermionic repeaters have been installed on the trunk telephones in Great Britain and abroad.



A vitreous enamelling furnace

For the surface hardening of special steels, by the "nitrarding" process, two types of electric furnace have been evolved. The single-chamber furnace for vitreous enamelling illustrated is 4 ft. 6 in. wide by 12 ft. long by 4 ft. 6 in. high, and has a rating of 250 kW; the operating temperature is 850 deg. C. It has electrically operated doors with push-button control from the pedestal, shown on the extreme left.

Other productions include a vertical cylindrical furnace for melting glass, several 30-kW furnaces for the heat treatment of steel magnets, and a 150-kW furnace for annealing aluminium sheets.

An electric thermal-storage heating system was recently put into commission. This comprises two 3,000-gal. tanks, each fitted with four nests of heaters having a total loading of 200 kW, thermostatically controlled. Electricity is taken during the night only (nine hours), and the flow temperature to the radiators is 160 deg. F.

The company regards it as probable that the 500-W constant-loading thermal storage cooker designed for rural conditions will usually be hired out by supply undertakings at a rental to include the electricity consumed.

Several large a.c. winders are in hand for collieries in the North-East Coast area; one of these is said to be the largest ordered for this district. The two induction winding motors of 2,500 and 1,500 h.p. have now been shipped for the South African gold mines.

"Bliss"-type cluster rolling mills are being built at the Fraser and Chalmers works. They are designed to cold-roll sheets up to 50 in. wide with ductility and high polish, as compared with the 15-in. wide sheets as a maximum with the ordinary two-high mills.

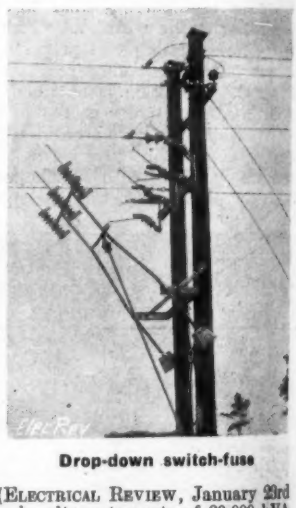
An important addition to the range of small motors are the new frame-cooled machines for gas works, chemical works, collieries, etc.; they embody special arrangements for the circulation of cooling air.

Sub-station Apparatus

Thirteen automatically controlled mercury-arc rectifiers of 1,500 kW output are in hand for two British railway companies, together with two 1,650-kVA 3-phase and thirteen 675-kVA single-phase transformers.

Metal-clad switchgear is being adopted to a greatly increased extent. New remote control and supervisory methods are being developed; of particular interest is a simplified supervisory equipment for use on 11-kV and 33-kV rural distribution systems. In this, ten separate operations can be performed by means of four pilot wires at each of any number of sub-stations up to thirty.

Eleven 132-kV sub-stations are under construction for the South-Western section of the grid. Transformers up to 30,000 kVA at 132 kV are also being made for the grid, as well as seven of 10,000 kVA at 120 kV for export. Other important work for the Central Electricity Board includes the provision and laying of 33- and 66-kV oil-filled cables. An installation of 33-kV, 3-core, lead-sheathed cable is also in hand for the Southern Railway main line electrification scheme—the first of its kind in the country.



Drop-down switch-fuse

Probably the most striking contracts completed in recent months were the electrical equipment of the *Monarch of Bermuda* (ELECTRICAL REVIEW, March 27th and November 20th, 1931), of the coaching stock for the Manchester-Altrincham railway electrification scheme (ELECTRICAL REVIEW, January 29rd and May 15th, 1931), and turbo-alternator sets of 30,000 kVA and over for Battersea Corporation, Hams Hall, and Nechells power stations.

Outdoor switching station at Hams Hall

Fractional H.P. Motors

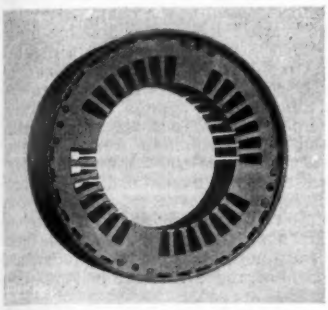
Some productions of a London company

ELECTRIC motors of under one horse-power are in a class distinctly and essentially of their own, and nothing seems quite to describe them adequately, except the somewhat cumbersome title of this article.

Possibilities for their development are enormous, particularly in this country. Up to only two or three years ago very few motors of the type were made at home, and it is probably safe to say that half the equipment purchased at present for use in England comes from abroad.

But apart from the possibilities of replacing the foreign-made machines there is a greater field offered in the replacement of other forms of driving, while the equipment to which the motors are at present successfully applied—portable tools, vacuum cleaners, polishing machines, refrigerators, and so on—represents in most cases a rapidly rising market. We learn that one American company supplies 700 motors per week for refrigerators alone.

The company with whose products this article is concerned is the Normand Electrical Co., Ltd., which undertakes to make every type of useful motor within and including the limits of one-eighth and one h.p. Single-phase repulsion-induction machines; one-, two-, and three-phase squirrel-cage motors; and all types of direct current motors are included in the range, running at speeds of from 960 to 2,800 r.p.m. Geared-motor units with driving speeds down to 26 r.p.m. are also a special feature to which attention will be given later. There is also a range of universal (a.c. series) motors with speeds as high as 8,000 r.p.m. The governing feature of the production throughout is generally to afford easy standardisation.



Ventilation ducts in unwound stator

Light-machine Driving

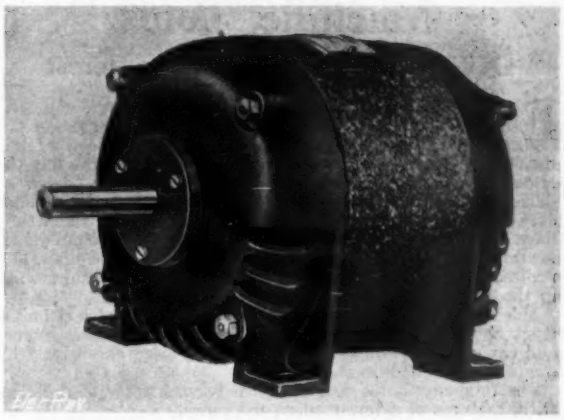
From the beginning the company has had in mind the light-machine maker, the man to please, for the motor is actually power plant for the light machine, and it must be so made that it is easy to build into the machine—pump, dynamo, mill, mixer, and so on. To that end both the a.c. and d.c. motors of the same rating are identical in dimensions. Further, the standard end covers can be replaced by flanged or spigoted covers of any shapes which will lend themselves to easy mounting on any particular machines.

A coffee mill is a good example of the special end-cover designs. A separate base is designed to fit the coffee mill stand, and the mill itself is bolted to a special spigoted end cover so shaped to give a smooth outline to the whole combination of mill and motor. The essential part of the motor is exactly the same in spite of the drastic alteration in the general appearance.

Ventilation Scheme

One of the most difficult problems of the small-motor manufacturer is to provide adequate ventilation within the very limited dimensions imposed by the machine maker. The company overcomes this difficulty by providing at the back of the stator (the hottest part) longitudinal slots through which air is passed by a centrifugal fan at the driving end.

It is probably not fully appreciated how easily the small motor can be adapted to light machinery, or what economic advantages are to be gained. Such advantages, for instance, as ease of control and greater convenience. In the event of a breakdown only one machine is closed down instead of a whole shop or works; there is only the expense of one motor for a replacement; and in addition the saving in power which results from the elimination of line shafting is very considerable.



Speed Ranges

The speeds of light machinery are generally either below 100 or between 200 and 300 r.p.m., so that there is a very high ratio between the efficient high-speed motor and the machine speed. With this in view the company has given special attention to the geared motor, and the essential feature of the design is that the motor and gear box are entirely separate units, i.e., the gear box is designed as a gear box purely, and the motor as a motor.

Because the stresses resulting from the torque are greatest at the low-speed end of the drive the unit is mounted on feet cast on the gear box and not on the motor, the latter being spigoted on to the box and held by four bolts. An advantage of this arrangement is that the motor can be slipped off and replaced easily and quickly.

The gear-box casting is in two sections, vertically, an arrangement which permits the provision of a second bearing for the final (driving) shaft, thus eliminating the uneven wear which would take place with a single bearing. An important feature is that the combined unit (motor and gear box) can be installed in precisely the same manner as a high-speed motor, for any type of drive and with no outboard bearing.

For ratios greater than 16 to 1 there are two lay shafts; only one such shaft is used for ratios less than this.

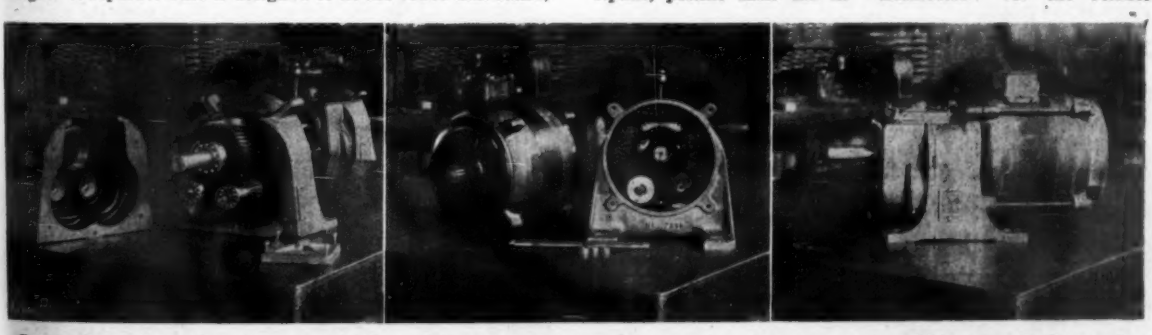
In all cases the arrangement is such that the final shaft is in line with the motor spindle. The centres of the final and lay shafts are the same in all cases, the various ratios being obtained by different numbers of teeth in the gear wheels.

Applications of Geared Units

To illustrate the very wide field of utility afforded by these machines, gearings giving driving speeds as low as, say, 1 or 2 r.p.m., permit their use as "telemotors" for the remote control of such apparatus as large ventilation dampers. The motor is arranged to move the damper, which may be several feet square, through a system of linkages. In the necessarily slow running of conveyors there is another obvious application, as the final low-speed motor shaft can be coupled direct to the conveyor pulley, thus eliminating countershafts or external gears, with a corresponding saving of space.

Another application is for farm machinery, much of which is arranged for hand driving at about 60 r.p.m. In such cases a geared motor can be direct coupled to the machine, which needs no alteration, it merely being necessary to remove the operating handle.

These geared motors can be made for any one of twenty-seven final speeds, and they can be wound for any commercial a.c. or d.c. voltages, a very useful feature being that motors for any voltage and for any speed are identical in external dimensions. This feature is, of course, in accordance with the company's policy of making matters as easy as possible for machine builders.



Two sections of gear box (gears on driving side); motor and complete gear box (gears on motor side); assembled geared-motor unit

Machine Tools

Developments of electrical interest

EXCELLENT service was rendered recently to the engineering industry generally by Messrs. Alfred Herbert, Ltd., by inviting, *inter alia*, foremen and responsible workshop hands to witness demonstrations and attend lectures on the latest developments in machine-tool practice.

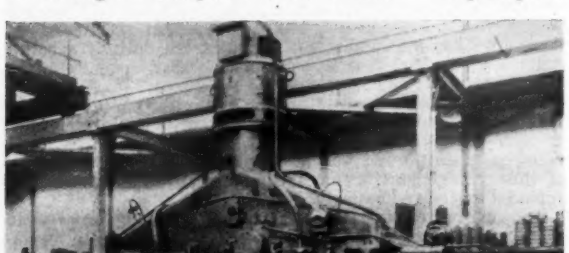
Too many highly skilled men know little or nothing about such practice beyond the particular methods upon which they have been engaged for, in many cases, twenty or more years. Machine-tool work essentially concerns the practical man, and it directly opposes the interests of progress to deny him a voice in the selection of the equipment he has to handle.

Machine tools have a triple interest to the electrical industry; they are a source of load, they employ electric motors and control gear, and they are necessarily used extensively by electrical manufacturers.

The following notes deal very briefly with some of the electrical features of a few modern machines.

Self-contained Machines

The Schiess-Defries "Express" lathe, one of the first machines to be specially designed for tungsten carbide tools, is directly driven by a variable-speed motor which, in conjunction with the three-speed gear of the headstock, affords spindle speeds of from 20 to 600 r.p.m. On the headstock is mounted an ammeter, so that the operator can see at a glance if he is utilising the full power of the machine. A quick-power



Lumsden rotary surface grinder

traverse motion, operated by an independent motor, is enclosed in the apron, while on the headstock and the saddle are push-buttons for starting, stopping and controlling the speed of the motor.

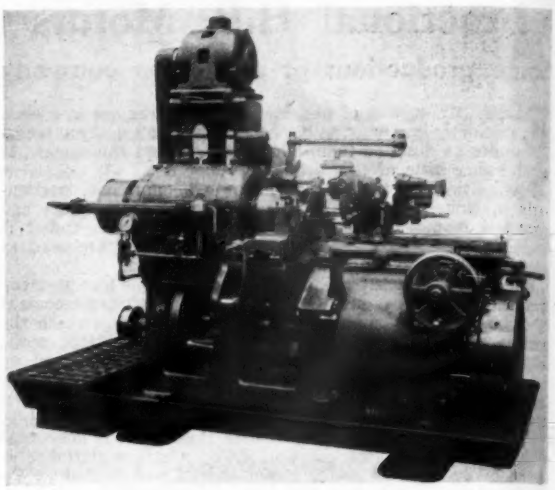
The new No. 24 Herbert combination turret lathe is believed to be one of the largest machines of its class yet built. Starting and stopping levers are placed at different points along the front of the machine for the convenience of the operator, and a hand-wheel is provided to turn the stop-bar for the saddle. Both saddle and turret stop-bars can be adjusted longitudinally by very simple means to suit the various lengths of castings or forgings in a batch.

Sensitive bench drilling machine

No. 3 automatic lathe, which does good service in the electrical industry in machining end brackets for motors, &c., was demonstrated fitted with an air-chuck and tooled up on a cast-iron sample using tungsten carbide tools. The work is held on a spigot and is pulled back by two air-operated clamps.

The No. 33 plain milling machine should appeal to manufacturers of electrical accessories because its high speed makes it particularly suitable for dealing with non-ferrous metals, while at the same time it has ample power for working on iron and steel. Speeds up to 1,200 r.p.m. can be obtained.

We were impressed by a demonstration of this machine fitted with a 3-in. diameter cutter working on iron at 134 r.p.m. and aluminium at 700 r.p.m. The separate driving box, bolted on the column, carries the single pulley and multiple-disc clutch and provides eight spindle speeds by sliding gears of



No. 3 automatic lathe

chrome-nickel steel. The speed-changing mechanism is interlocked to prevent the engagement of conflicting gears. The motor, when "built in," is carried by a plate mounted on the column, with adjustment for tensioning the chain.

A new motor-driven ball-bearing drilling machine has a constant-speed d.c. motor which drives the spindle through a four-speed gear box. The motor is started, stopped and reversed by a conveniently placed switch lever, and the reverse may be used for tapping. In a similar type of machine being built for a.c. motors the motor has four speeds controlled by a convenient lever, and a geared spindle can be supplied which, running open or geared, gives eight spindle speeds.

The Type S high-speed sensitive bench drilling machine has been developed for the finest class of work, using drills up to ¼ in. in diameter, or ⅜ in. on soft metals. It is self-contained and the main elements are a strong column, a spindle head and electric motor, which are adjustable on the column, and a base plate. The drive is so arranged that the belt pull does not affect the spindle.

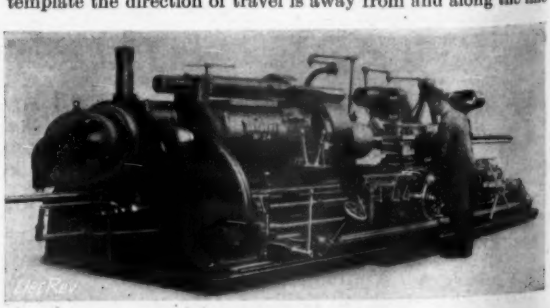
Producing Contours Automatically

The Keller automatic tool-room machine will produce complicated contour work such as punches and dies for press tools practically automatically from a master template. It is equipped with an independent motor for every motion, and is available in sizes up to one capable of making dies for pressing the sides of motor-car bodies.

It can be equipped with vernier scales which practically convert it into a jig-boring machine. These scales set electrical contacts, and when the traverse motors are brought into action the slides are moved to the extent indicated by the vernier, irrespective of any backlash in the traversing mechanism.

Although all the tool movements may be operated separately by switches on the control box, the outstanding feature of the equipment is its operation under tracer control. The tracer guides the horizontal and vertical movements while it maintains continuous contact with the edge of the template. Both the tracer and cutter spindle are mounted on the same vertical slide and have a fixed relation to each other.

One end of the tracer spindle carries the tracer proper, while at the other end are four pairs of contacts, one of each pair on the movable spindle and one on the fixed surrounding sleeve. Two pairs of the contacts are normally held closed under spring tension. Before the tracer point touches the template the direction of travel is away from and along the line



Combination turret lathe

bisecting the angle made by the two lines from the spindle and the contacts, respectively.

When the tracer point meets the template, very slight pressure alters the formation of the closed contacts according to the direction of the pressure. The contacts control magnetic clutches on the various drives, with the result that the motion of the cutter is changed in accordance with the shape of the template.

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

A Means of Reducing Mining Costs

THE use of electrically driven conveyors underground in coal mines and their economic advantages are discussed in the paper which Mr. W. B. Hird and Mr. J. B. Mavor read at the INSTITUTION OF ELECTRICAL ENGINEERS on February 11th.

The different classes, viz., shaker, belt, and scraper conveyors, and, in association with these, gate-end loaders and similar apparatus, are considered in turn. The special advantages of using conveyors and loaders in groups are discussed and the difficulties to be overcome in using such combinations are described; special stress is laid on the switching arrangements necessary to enable full advantage to be taken of such grouping.

The special points to be attended to in the design of electric motors to be used for driving this class of apparatus are indicated and it is explained that the problem of driving coal-face machinery electrically is easier on a 3-phase than on a d.c. supply.

Although it is not possible to make motors for conveyor work which will comply with the requirements of Standard Specifications so far as heating and electrical qualities are concerned, there is no difficulty in complying with all the requirements for flameproof enclosure contained in the British Standard Specifications for flameproof enclosure (No. 229) and for motors for use in mines (No. 270). Such flameproof enclosure must of necessity be provided whenever the motor is to be used in a fiery mine, and apart from any danger of explosion the shell must be strong enough to give the working parts reasonable protection against mechanical damage from falls of roof and similar accidents.

ECONOMIC ADVANTAGES

There is a definite saving in the number of men required to clear a face when mechanical means of conveying the coal are provided, which more than compensates for the depreciation, interest and running costs of the conveyor; but very much more important than this is the saving realised when mechanical conveying is combined with mechanical coal-cutting, due to the totally different organisation of the intensive working imposed by these mechanical aids.

The concentration of the output from a much smaller number of faces is a matter of great importance. The output from very much longer faces can be brought to one "mother gate-road" more easily when worked mechanically than in the case of hand work, and the savings effected by this concentration are extremely important. Not only does it mean a very greatly decreased cost on keeping open roads which can now be much fewer in number, but there is also a definite advantage, and in places where the roof is tender a very considerable saving is frequently realised from the rapid and perfectly regular advance of the face, which effects a reduction in the cost of timbering, as much of the timber can be extracted and used again as the face advances.

Instead of working more or less at haphazard the transport of coal can now be definitely organised, much in the same way as the transport of manufactured articles can be organised in a mass-production factory.

REGENERATIVE CONVEYORS

When the workings go up an appreciable incline, regenerative conveyors are used, and power proportionate to the output is put back into the line. A case of this kind in which the entire output of a colliery, amounting to 3,000 tons per day, is being brought down the hillside from the mine, shows the remarkable regenerative capacity of 50 h.p., which, taken over a year's working, should approximate to a saving equal to the total depreciation and maintenance of the entire conveyor plant.

The authors encountered an extreme case not long ago where an old colliery was turned over from hand-winning to machine-cut and machine-conveyed coal; before the introduction of machinery the working faces totalled two miles in length and were scattered over several districts. Three 100-yard faces equipped with conveyor units were started, and the rest of the pit was laid idle. Within three weeks the output of the colliery was normal and the output per man employed above and below more than doubled. Before the introduction of machinery more men were actually employed on road maintenance and transport than on hewing coal.

CONSIDERABLE SAVINGS

Taking all the savings which can be effected by changing-over from hand-got to machine-got and machine-conveyed coal, it may be said that savings as great as 50 per cent. in the cost of the coal at the pithead have been realised in favourable cases, whilst a saving of 25 per cent. is not uncommon.

The best-equipped collieries in Britain now compare favourably with any European colliery on the basis of output per man employed. Since 1918 the number of underground conveyors in use in this country has increased more than five-fold, and the rate of progress is still increasing; it is not an over-statement of fact to say that conveying is one of the most important developments in coal-mining, and that the economies accruing therefrom are, as yet, only partially realised.

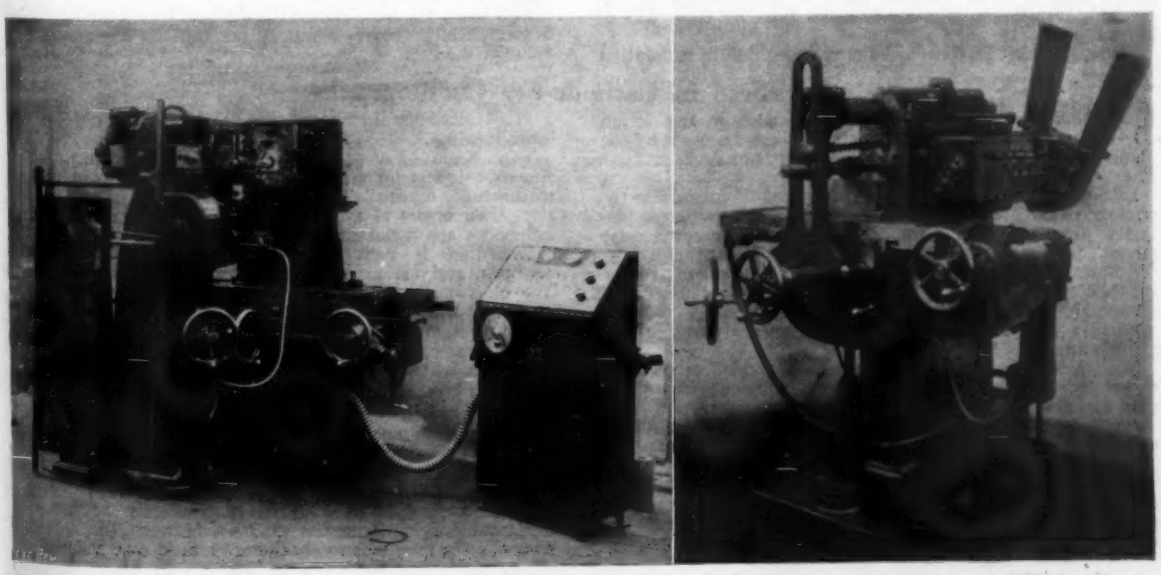
Indian Railway Electrification

THE South Indian Railway's 1922 scheme of improvements included the electrification of the suburban system in the Madras area. The equipment of 18.1 route miles of new double track and 7.3 miles of sidings for operation at 1,500 V d.c. is described in the paper which Mr. B. G. White recently submitted to the INSTITUTION OF CIVIL ENGINEERS.

Electricity is obtained from the mains of the local supply authority and by agreement the railway can give from its own transmission-system small bulk supplies to licensees in areas not served by the mains of the supply authority. This arrangement, which has been made with a view to increasing railway traffic by fostering development in such areas, may lead to greater use of railways for the development of electrical distribution in unserved areas.

The 5,000-V, three-phase, 50-cycle supply is received at the Madras Egmore sub-station, where it is stepped up to 33,000 V for transmission to the Minambakkam sub-station. A subsidiary supply, at 5,000 V, is distributed throughout the electrified area for the lighting of stations and yards and the operation of equipment. A signalling supply, independent of other supplies, is distributed by a 400-V cable laid underground for 11.2 miles.

The three-phase supply is converted by mercury-arc rectifiers at the Egmore and Minambakkam sub-stations to 1,500-V d.c.



Keller automatic die-cutting machine and milling machine. (*See opposite page*)

for traction. The sub-stations incorporate special features of design, partly on account of the installation of mercury-arc rectifier plant, and also with a view to overcoming the difficulties of maintaining electrical plant in the tropics. The Egmore sub-station includes an outdoor step-up transformer station, and also has a control room for the electrified services. Both sub-stations are non-manual, and are ventilated by pressure systems incorporating viscous type filters. At Minambakkam a switching tower avoids the use of 33,000-V cables.

The overhead system of current distribution to the track is employed, single expanded-steel masts placed between the two electrified tracks carrying two single catenaries, each supporting a contact wire. On curved tracks the gantry type of construction is used.

For the first stage of the scheme, 17 multiple units of coaching stock have been provided. These are articulated, with the motor bogies at the point of articulation, and special provision has been made for the exclusion of dust and removability of electrical equipment. Four electric locomotives have been supplied for handling goods-traffic on the 18 miles between the classification-yard at Tambaram and the yard at Madras Beach adjoining the harbour. Two battery tenders have also been provided, to allow of the locomotives being used on certain sidings which have not been equipped for electrical operation.

Cheaper Fuel Favours Diesel Operation

THE annual report on heavy-oil engine working costs, 1930-31, which is compiled by the DIESEL ENGINE USERS' ASSOCIATION and was discussed at its last meeting, continues to be well supported by members. The number of returns increased by six to fifty since the preceding report, and many more private stations are represented.

The request for information regarding the working costs of surface-ignition or semi-Diesel type engines was responded to by the Westland Electricity Works (Branch of Petters), Ltd., who sent a very complete set of statistics covering a working period of six consecutive years. A mass of most interesting information has been received from the Engineer-in-Chief, Army Headquarters, India, regarding the working costs and other aspects of the use of the 220 oil-engine-driven plants in India. The matter of prime interest to the Association is interspersed with a great deal of other information regarding steam-driven plant and supplies of electricity taken in bulk, so that it could not be extracted in time for inclusion in this report.

[Topical Press

Mr. Joseph Shea, who has retired from the position of assistant superintending engineer of the Post Office Engineering Dept., Leeds, after 42 years' service

The old form of Table I (list of engines) was used to elicit some information as to the degree of service and age of the different sizes and types of engines. It clearly demonstrated that a well-made heavy-oil engine is a very durable machine, and that very many quite small oil engines continue in highly efficient service after many years of operation. The great difference in rating as a result of supercharging is made evident, and three supercharged engines, each of 1,200 b.h.p., have already been installed by members, although only one appears in this table, so that reports on the performance of this type of engine in regular service should be forthcoming with the next batch of returns.

NEW PLANT INSTALLED

During 1930-31 new engines aggregating 5,900 kW were installed among the stations which have returned particulars. They included three of the air-injection, two-stroke opposed-piston type of from 1,440 to 1,500 b.h.p., and five of the mechanical-injection high-compression type of from 480 to 935 b.h.p.

Although there have been many changes due to generating stations being connected to the grid, the total output on which the results recorded have been obtained shows an increase of 6 million kWh, due to the increased interest of private firms in the report.

There was an improvement in the engine costs per kWh generated of 6.5 per cent. for home stations and 12 per cent. for overseas stations, partly accounted for by falls in the average price of fuel oil and lubricating oil, but generally operation was better than in the preceding year. There is again the curious fact that several stations employing mechanical-injection high-compression engines pay considerably below the average price for fuel oil, for which no explanation has been forthcoming.

FUEL CONSUMPTION AND THERMAL EFFICIENCY

The total output was generated by the 220 engines employed during the year in the following proportions: 149 engines of from 15 to 499 b.h.p. generated 37.1 per cent. of the total output; 56 engines of from 500 to 999 b.h.p. generated 46.3 per cent. of the total output; 15 engines of from 1,000 to 1,700 b.h.p. generated 16.6 per cent. of the total output. The average gross calorific value of the fuel is taken as 19,500 B.th.u. per lb., and the general average fuel consumption per kWh generated was 0.692 at an average running plant load factor of 66 per cent. The overall thermal efficiency, calculated on the gross heat value of the fuel, was therefore 25.4 per cent. approximately. This result is slightly better than that for the preceding year.

At the Worthing station the improvement in fuel consumption forecast by Mr. G. Porter last year has been realised. He carried out extensive renewals of liners in 1929-30 and suggested that it might often be advisable to consider their renewal from the point of view of the fuel saving thereby to be effected without regard to purely mechanical factors. Mr. E. W. Johnston, of King's College Hospital, noted that frequent cleaning of engine flame plate orifices resulted in a tangible improvement in fuel consumption. This is borne out by the latest reported results for his station.

LUBRICATION AND REPAIRS

Although the general average performance is below the standard, which is 2,380 rated b.h.p. hours' run per gallon of lubricating oil, there has been an improvement of 17.4 per cent. in the case of home stations and of 25.3 per cent. overseas. The average of 37 home stations was 2,020 b.h.p.-hours.

Although a good deal of heavy renewals were carried out during the year, the average cost per kWh generated of repairs and maintenance was better than in the preceding year. In home stations it was 0.113d. per kWh and 0.106d. overseas. The average for home stations was 0.083d.

At the Ashford (Kent) Urban District Council's station an engine exhaust waste heat boiler has been installed for warming the station buildings and for heating fuel and lubricating oils before cleaning them.

At Messrs. Harrod's station the exhaust passes through water heaters, which recover about 10 per cent. of the actual heat value of the fuel.

Advances in Cathode-ray Oscillographs

SOME of the more important developments in the design and use of cathode-ray oscillographs were discussed by the Meter and Instrument Section of the INSTITUTION OF ELECTRICAL ENGINEERS on February 5th.

In a paper by Mr. A. B. Wood methods of increasing the photographic or recording sensitivity are first considered, particular attention being given to (*a*) focusing the cathode-ray stream, (*b*) increasing the sensitivity of the photographic film, (*c*) the use of phosphorescent materials as a means of increasing photographic sensitivity and of facilitating "external" photography, and (*d*) increasing the exciting voltage and consequently the kinetic energy and penetrating power of the cathode rays.

With regard to (*d*), particular attention is paid to Lenard's observations on the penetrating power of high-velocity cathode rays and the application of his results to the design of high-voltage oscillographs fitted with a "window" for direct external photography.

Referring to the technique of recording by cathode rays, consideration is given to the various methods of generating a "time" axis and to methods of voltage sub-division. The paper concludes with a section dealing with the recording of isolated electrical impulses.

ACCURACY OF MEASUREMENT

The accuracy of measurements made with hot-filament cathode-ray tubes is the subject of the paper which Prof. J. T. MacGregor-Morris and Mr. H. Wright read at the same meeting.

Various sources of error which are encountered in its use as a measuring instrument are discussed, including errors inherent to the tube, especially those due to the effect of gas conduction, then errors of manipulation and those due to external influences are reviewed.

Recording is next dealt with, including photographic methods, and various methods of calibrating are considered. The chief part of the paper, however, deals with what is known as the "threshold effect," a quantitative examination of which is given, together with graphs showing its relation to the various variables, such as frequency and the effect of resistance in series with the deflecting plates.

THE THRESHOLD EFFECT

It is suggested that the threshold effect is due to the fact that free ions must be in existence. These ions are produced by electrons in the cathode stream which has penetrated beyond the anode, partly by the escape of electrons from the stream and partly by collision with gas molecules.

All these electrons have quite a high velocity, so that, even when there is no potential gradient between the deflecting plates, some ions will reach them by their own velocity. If a potential difference is set up between the plates, however, a definite drift will be set up, electrons going towards the positive plate and positive ions towards the negative.

The great difference between the mobilities of the two kinds of ions causes a concentration of positive ions, i.e., space charge, near the negative plate, thus causing the potential gradient to be greater over this part than over the rest. As the p.d. between the plates is increased, the potential gradient over the part occupied by the space charge does not increase so rapidly as that over the rest, owing to the limited supply of positive ions to form the space charge.

There is still need for knowledge of the effect of frequency, while the physical explanation of the threshold effect requires to be fully developed. The determination of the relation of the "space charge constant" to the gas pressure and other controlling factors, would materially assist in the development of a sound theory.

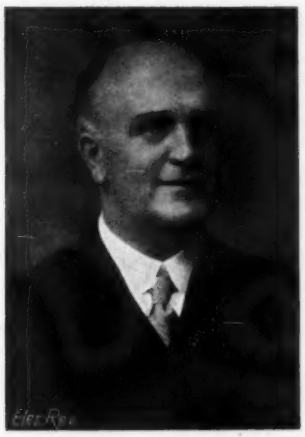
The field of use of such apparatus will continue to expand more and more, especially in those cases where rapidity of response is essential. The simplicity of action, the ease of visual observation, and the absence of risk make the low-voltage tube an instrument of general utility in the laboratory.

A New Tube

Since the completion of the paper Standard Telephones and Cables, Ltd., have produced a new type known as the "4018 A" tube. This is almost identical in construction to the older one, but it depends on a shield round the cathode stream for its focusing, and is designed for a higher anode potential. With this method of focusing, the size of the spot becomes independent of the filament current over quite a wide range, so that it is possible to use a high anode potential with a low filament current, thus reducing the magnitude of the threshold error and at the same time obtaining a brighter spot, which has also been still further improved by providing a better fluorescent material.

The tube has a sensitivity some 40 per cent. higher than would be predicted by simple theory, even when the decrease due to the threshold error is not allowed for. This result has been confirmed by two other independent experimenters using the same tube and by the manufacturers who, when using another tube, obtained about 10 per cent. difference. At present the authors are at a loss to account for this difference, and the matter is still under investigation at the East London College.

The following points should be noted with reference to the newer pattern of tube: (1) the possibility of obtaining a linear response of the spot to the deflecting voltage; (2) a large increase in the average life; (3) a brighter and better-defined spot; (4) a reduction in the cost of the tube.



[Hadley, Nottingham

Mr. E. Gomersall, superintending engineer of the London Telephone District, the 1931 report of which is mentioned on page 244 of this issue

Dr. McLaughlin on the Shannon Scheme

DR. T. A. McLAUGHLIN, lecturing before the Association of University Electrical Engineers in Dublin upon the economics of the Shannon scheme, was received by an audience composed mainly of members of his late staff.

He explained the basic intentions of the experts' report, upon which the scheme was designed and carried out and corrected certain popular errors, such as that the experts had expected the "first development" to return a profit on capital expenditure.

Effects of Cheaper Fuel

They had said that on the initial outlay of £5¼ millions there would be a deficit of about 1¼ per cent.; the expenditure of another couple of million pounds would produce the required margin over all costs, and they estimated that five years after completion of the first stage the scheme should be in full paying condition. There was every sign that this point would be reached considerably earlier than 1935, which would be the end of the five year period.

The expert's figures relating to sales in bulk were upset by the fall which took place between 1924-9 in the cost of generation in the fuel stations which were to be superseded or taken over. This amounted to about 33⅓ per cent. owing to improved load factors, increasing efficiencies, and cheaper coal.

For instance, the cost per kWh of production at the Dublin Corporation (Pigeon House) station in 1924 was 0.99d., but in 1929 only 0.52d.; a decrease of 47 per cent. At the Dublin tramways station the cost in 1924 was 0.805d. and in 1928 0.534d.; and at Cork the figures were 1.0d. and 0.5d.

The problem of supplying these vitally necessary components of any national scheme would have presented little difficulty to the Supply Board at the date of the experts' report, but a very different situation had developed by the time acquisition of these loads had become practicable.

The obvious policy for the Board to pursue was development of the load to the fulfilment of the first stage in the shortest possible time, and he had strained every nerve and fibre of his new organisation to accomplish that end. Unquestionably it lessened the losing period by a year or more, and avoided a very delicate situation.

Out of this clamant need for speedy load building was born what Dr. McLaughlin claimed as the master stroke of his national supply policy. It was the decision to undertake not only generation and transmission but final distribution, thereby cutting out all the disadvantages to the consumer which are becoming more evident in Great Britain as the grid grows.

Wasted Water Power

The lecturer showed that the plant utilisation factor over the entire system was about 40 per cent., which meant that 60 per cent. of the water which the existing turbines could use was running to waste. He showed also that the recent increase of 25 per cent. in price of electricity had not only raised it above the average price paid in comparable groups of English towns, but had made it actually dearer in many Irish towns than it was when local stations were supplying.

Some Electro-physical Papers

FIVE papers were presented at the February 5th meeting of the Physical Society.

Prof. E. V. Appleton and Mr. F. W. Chapman, King's College, London, have studied the variation of the radio-frequency conductivity of ionised air with pressure experimentally at frequencies of the order of 10^9 cycles. From the measurements of the critical pressure at which such conductivity is the maximum, the magnitude of the collisional frictional forces experienced by vibrating electrons has been estimated

Mr. R. M. Davies, University College of Wales, Aberystwyth, has shown how to determine the moisture content of seeds rapidly by means of a d.c. galvanometer and battery. For large seeds he uses a thermionic oscillator.

Atoms and Heating

By making a nearly parallel beam of positive rays emerge through a cylindrical aperture in a cathode, and enter a space where the vacuum is kept high enough for gas collisions to by negligible, experiments have been carried out to decide whether the impact of neutralised atoms in the beam is able to heat a solid target to the same extent before and after their spontaneous return from excited to normal atomic state. This has been done by Dr. M. C. Johnson at Birmingham University by investigating the disturbance of a bridge balance between two filaments accurately aligned across the beam at different distances along its path. An excess of heating is shown to occur in that filament which receives the larger proportion of atoms in excited states.

Dr. H. C. Hepburn, Birkbeck College, shows how the electrolytic water-transport per faraday in the case of copper sulphate solutions remains constant with increasing concentration of copper sulphate up to normal, as the author has shown in a formal paper, but decreases regularly with further increase in concentration. The determinations of the electrolytic water-transport are employed to correct the values of the experimental Hittorf ionic transport number.

Mr. R. A. Fereday, East London College, explains how the magnetic susceptibilities of a number of compounds of nickel in the solid state have been measured at room temperature. The atomic susceptibility of combined nickel is found to remain constant, except in the cases of the anhydrous cyanide and of dioxide compounds. Some of the latter are diamagnetic.

Electricity and the Coal Industry

Proposing the toast of the "Institution of Electrical Engineers" at the annual dinner and dance of the North-Eastern Centre of the Institution at Newcastle, Mr. W. Cochran Carr said that as president of the North of England Mining Institution he knew what a close connection there was between the two industries and the two institutions. He hoped, however, that the grid would not disturb the continuity of the coal trade. Capt. J. M. Donaldson, President, I.E.E., said he hoped the North-East would emulate the remainder of the country and "keep its tail up." He had visited other districts and had been glad to find their tails not only standing up but wagging violently.

Electricity Replacing Horses

Speaking at the annual dinner of the North of England Institute of Mining and Mechanical Engineers at Newcastle on February 5th, Mr. J. B. H. Forster, vice-chairman of the Durham Coal Owners' Association, stated that by increasing the use of electricity during the last ten years they had been able to reduce the number of underground horses and ponies by 25 per cent. They were now eliminating to a greater extent the manual work of the miner by the use of machinery.

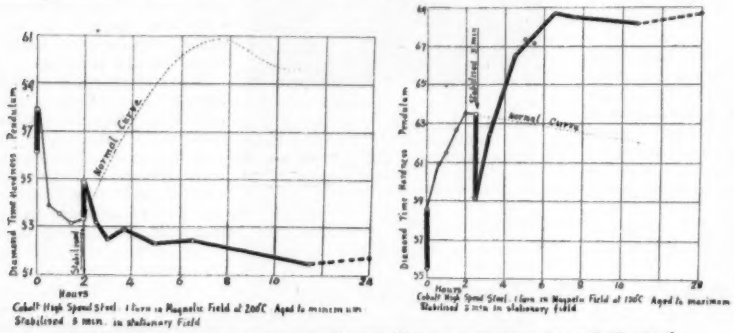
Magnetic Effects in Metals. By E. G. Herbert, B.Sc., M.I.Mech.E.

Changes which are shown to be atomic in character

SOME of the remarkable effects which are produced in metals when they are rotated in a strong magnetic field were referred to in the ELECTRICAL REVIEW of March 20th, 1931 (p. 527).

Such treatment does not simply harden the metal, but causes it to go through a sequence of hardness changes which were at that time believed to be atomic in character. Further research has strongly confirmed this view and has thrown light on their essential nature.

It has become clear that the alternate softening and hardening at increasing intervals of time is a periodic effect due to some pulsation taking place in the atoms themselves, and it has been attributed to a gyroscopic precession of the electrons; a slow and rhythmic displacement of their axes of revolution, set up in the first place by the magnetic disturbance and persisting for many hours, thus causing periodic fluctuations in the mutual electromagnetic attraction, or cohesion, which is the basis of hardness and other physical properties.



Application of the rotary and stabilising processes to cobalt steel

It has been found possible to set up pulsations of like character by other than magnetic means, *e.g.*, by quenching from high temperatures and by severe cold-working processes, and it seems probable that the phenomenon whose discovery was the starting point of these researches, namely, the spontaneous after-hardening which continues for some hours in hard steel which has been superhardened by the "cloudburst" process of bombardment with steel balls, is itself a particular phase of an atomic (that is to say, an electromagnetic) fluctuation set going by the severe mechanical disturbance.

The experiments devised to test the precession theory* have led to an important practical development by the invention of a secondary, or stabilising, magnetic process for rendering permanent any selected phase of the fluctuations set up by the rotary magnetic process, or by thermal or mechanical means. The two graphs illustrate the application of the rotary and stabilising processes to a modern high-speed steel, the "X.L.D." cobalt steel of Messrs. J. J. Saville & Co., who supplied the specimens in the hardened state.

The maximum phase of the specimen treated at 150 deg. C. was selected for stabilisation, and this resulted in a temporary fluctuation leading to stability at a degree of hardness high above the previous maximum. The specimen treated at 200 deg. C. was stabilised at the minimum phase, and this again caused a temporary "flutter" and stability *below* the previous minimum.

The principle here illustrated is expected to have important practical applications, and the process has been patented. It has been found possible to induce and render permanent a very high degree of hardness in such articles as razor blades, drills, and other tools, or to stabilise metal in the critical condition represented by the minimum phase, which is believed to be associated with physical properties of an unusual character.

The latest magnetic table for applying the rotary and stabilising processes provides a powerful field in a gap 12 in. long and adjustable in width, or, by reversing the tables, a more concentrated field in a short gap of variable width. The rotary treatment is effected by placing the specimen across the gap and rotating it once, so as to change the direction of polarisation through 360 degrees. High-speed steels are usually treated hot. The most favourable temperature depends on the characteristics of the steel, but is generally not above 250 deg. C. As the rotary treatment only occupies a few seconds, the article can be preheated in a bath and transferred to the magnet while hot. A gutter is provided to carry away any liquid that may be present.

The stabilising process is applied cold, and consists in placing the specimen across the gap for a minute or more. It is essential that stabilisation be carried out a definite number of hours after rotary treatment, being so timed as to coincide with the selected phase of the fluctuations set up by the latter. The course followed by the fluctuations will have been determined by preliminary experiment, consisting of serial hardness tests on a similar specimen.

Magnetic table for applying the processes

* See *Metallurgia* (i) Hardness of brass, steel, duralumin, affected by magnetism; (ii) Effect of temperature in the magnetic treatment of steel; (iii) The precession theory of hardening, and the stabilisation of metals by magnetism.

A Small Water-power Scheme

AN interesting small hydro-electric installation has just been completed to the order of Mr. W. H. Mappin, of Ynyshir Hall, Glandyfi, Wales. The plant was primarily intended to supply electric light, heat, and power for the estate, but Mr. Mappin decided to extend the mains to the neighbouring villages of Eglwys Fach and Furnace, the inhabitants being responsible for the wiring of their own houses.

The power is derived from the neighbouring waterfall of the river Einion—the falls being about 40 ft. high—and concealed steel troughing conveys the water from its lip to an intake and strainer chamber near by. From this a 21-in. steel pressure pipe conveys the water a distance of about 400 ft. to the power house, situated close to the bank of the river lower down.

The plant in the turbine house consists of two Gilkes turbines of 22 and 11 h.p. standing each side of and direct coupled to a 20-kW English Electric 230-V d.c. dynamo. A single oil-pressure type governor controls both turbines, and the arrangement enables either or both turbines to drive the dynamo to give 11, 22 or 33 h.p. according to the water available. Electricity is transmitted from the power house to the hall, farms, and villages, by means of bare mains supported on wood poles obtained locally, and is used for lighting, cooking, water heating, radiators, sawing, and farm machinery. The loss in transmission does not exceed 7¼ per cent.

There is a contract rate of 10s. per light per annum up to 10 lights for the smaller houses, above which the consumers have the option of being charged by meter at 9d. per kWh, subject to a minimum guarantee of £3 per annum. Four places of worship are included in the supply, the screened lighting of the chancel of the parish church being especially pleasing.

At the inauguration of the plant the contractors floodlighted the waterfall. A 1,000-c.p. G.E.C. floodlight fitting was effectively screened behind the jutting out rocks, between the waterfall and the main road bridge, and coloured lights were thrown on the falls between dusk and 11 p.m. for the first week of the supply.

The whole of the installation was designed and carried out by Gilbert Gilkes & Gordon, Ltd., under the supervision of their director, Mr. W. M. Harris, A.M.I.E.E., assisted by Mr. H. Walker, of their London office.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Companions of the Institution

As I believe I have the honour of being the second, if not the first, person to be made a Companion of the then new grade of membership of the Institution of Electrical Engineers, I have read with considerable interest the leading article on the matter in this week's ELECTRICAL REVIEW. Like, I imagine, most Companions, my technical knowledge is *nil*; nevertheless, my prosperity or otherwise is as much linked to that of the electrical industry as that of the most eminent engineer boasting innumerable degrees.

Obviously, as you say, the Institution must be preponderantly technical, but there are non-technical sides to every industry, and it was evidently to rope in these non-technical people that the Companionship was created. So far as I am concerned, I should be only too pleased to place a certain amount of time and a good many years' experience of electricity supply finance at the disposal of the Institution, and I feel quite sure that all my fellow Companions would be equally willing to render service in their various capacities once given the opportunity.

COMPANION.

February 3rd, 1932.

Rational Costing

I have read with much interest Mr. Saunders's article on this subject in your issue of January 29th because I have adopted practically this method for the last twenty-five years.

My attention was drawn to the erroneous method of taking overhead charges as a percentage on labour because I was at the time producing an article by very cheap labour; the costs came out absurdly low on the method of taking the usual 100 per cent. twenty-five years ago, but the profit at the end of the year was not in conformity with the estimated cost.

On thinking over the matter it became evident at once that the cheaper the labour the greater the on-cost charges per hour, because everyone in the works requires the same amount of light, the same proportion of rents, rates, taxes, depreciation, &c., probably the same amount of power, but more supervision.

What we did, therefore, was to take the total standing charges for the previous half-year and divide them by the total man-hours worked and add to the cheaper labour the charge-hands' wages. Now this method is practically exact provided the standing charges and the man-hours in the subsequent half-year are the same as before, but in a small works the output and the standing charges are remarkably constant.

Mr. Saunders is therefore wrong in stating that the method "invariably" used is that of reducing them to a percentage of the labour charge, as in course of business I have found other firms who adopt the hourly basis also.

Where overtime is worked it might be more accurate, instead of taking the actual hours worked, to take the actual hours plus a quarter, assuming payment is being made at the rate of time and a quarter. Overtime usually costs more not only because of increased rate per hour being paid, but because it is usually at night when lighting is required and the supervision per head is probably greater as all the hands under one foreman will probably not be working.

Mr. Saunders is certainly correct in stating that it sometimes pays to work overtime. I have proved this by working five hours per week overtime, paying at the rate of time and a quarter, for the last four or five years; fifty-two hours constitutes the normal week of my firm, and it is only when we get slack that we return to the forty-seven-hour week. This, of course, has the effect of increasing output, and does not involve such frequent changes in the number of hands employed.

Generally speaking it is of course a simpler matter to get accurate costing in a small works such as this, but at the same time it seems to me that large firms do not sufficiently co-ordinate their departments and endeavour to make each department pay its way; it might pay them very much better to allow certain departments to work at an apparent loss if it enabled them to keep the whole custom of certain customers who might otherwise buy elsewhere.

February 3rd, 1932. WORKS MANAGER.

These Discounts

In your last issue "Fair Play" sums up the attitude of the motor manufacturers during the past, and I maintain that this attitude is quite wrong when viewed from a proper business angle and that "live and let live" methods of doing business would pay the manufacturers in the long run.

It cannot be expected, owing to the divers types, horse powers, speeds, voltages and periodicities of motors, that contractors should keep an appreciable stock, but given support and assured reasonable discounts, and being in close touch locally with power users, they would give this matter their consideration.

Contractors are responsible for the design and installation of many large and small power schemes, and frequently find, after considerable preliminary work, that an order for the motors has been secured at cut prices by one of the many manufacturers, whose numerous representatives are continually canvassing likely power users. The cost of this canvassing must add considerably to the manufacturers' overhead costs, which could be avoided by more conservative and fair treatment of the contracting industry. Manufacturers' representatives calmly suggest to the contractors that they should be well satisfied with a 5 per cent. or 7½ per cent. discount on even small motor sales; they ignore the fact that their friends, the contractors, have—like the manufacturers—overhead charges to meet, and are consequently entitled to a reasonable profit for their labours.

As a contractor of long standing, I assert that the motor manufacturers have never fairly protected the genuine contractor, or given him a chance to deal in their goods on an ordinary business basis. Their representatives canvass the district direct, cutting each other fiercely with regard to price, in the process, and then they expect orders from the contractor, offering the before-mentioned generous(?) and alleged preferential discounts.

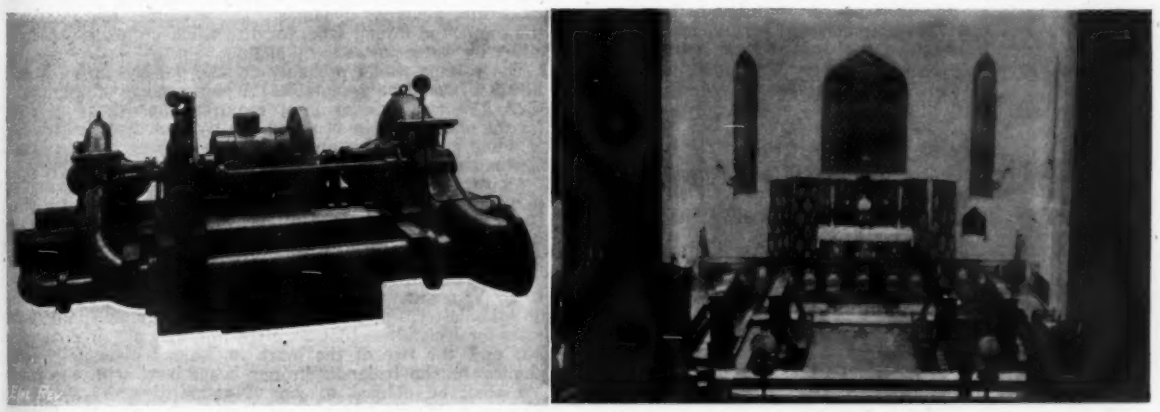
This indiscriminate competition, instead of reasonable price maintenance with fair trade discounts, is surely against the interests of quality, the manufacturer and the user, the latter losing also the benefit of personal service. The boot seller does not expect the local contractor to buy his boots direct from the manufacturer, but he is canvassed direct by the motor manufacturer, who actually competes with the contractor to obtain the order.

I have, and I am sure many other contractors have had similar experiences, obtained inquiries for equipping a works with electric power, drawn up and submitted a reliable and efficient scheme, only to find that a host of manufacturers' representatives have subsequently got in touch with the customer, and actually supplied motors direct at prices that left nothing for the contractor, maintaining that if they had not done so, some other manufacturer would have secured the order.

As this state of affairs has been going on for many years, I despair of any improvement, although I am confident that an agreement, similar to that of the E.L.M.A., would have an equally good result all round.

REAL FAIR PLAY.

February 6th, 1932.



One of the turbines employed in the water-power scheme described on the opposite page, and the illumination of the parish church

"Fair Play's" excellent letter supplements my article by emphasising that part of the argument which I purposely cut short, as I wished to stress the existence of a possible channel through which motor sales could be increased.

In the experience of my own firm, about 70 per cent. of sales are now made to machinery manufacturers, almost all of whom standardise our motors as power plant for their machines. Of the remainder, 24 per cent. (these figures are approximate) are made to electrical contractors and the like, 4 per cent. to factors, and 2 per cent. direct to actual users. "Fair Play's" contention that the user is the best customer is thus not borne out by our experience, but I would suggest that this is owing to our policy of quoting full list price to this class, while "Fair Play" quotes to the user the same price as to the best classes of resellers.

My whole argument was that the user should buy his motors from one or other of the reselling classes who, if they were protected all round as my own firm protects them, would very soon endeavour to create a demand for small motors, as "Fair Play" suggests in his last paragraph that they should do. But it is not reasonable to expect the trade to spend time and money in creating a demand if they are to be undersold by the manufacturer quoting large discounts direct to users.

With the rest of "Fair Play's" letter I am entirely in agreement. The sales of British motors through factors are very small—I said so. But I cannot see why the factor should not be given "fair play" and a chance to reform the bad habits into which the motor manufacturers have forced him, and I am convinced that if he were given this chance he would take it and sell British motors instead of the often inferior foreign machines he now stocks.

I must deal with "Fair Play's" first paragraph. I can assure him that I am interested only in the manufacturing side of the business, and no doubt the Editor would confirm this. I did not publish my name or that of my firm, as I wished my argument to be considered on its merits, and would not have it thought that I was seeking a free advertisement. I would be glad to disclose my identity to anyone interested.

VANADIS.

February 8th, 1932.

The E.T.B.I. Festival

I shall be very grateful for the use of your columns to remind your readers once again that the Annual Festival Dinner of this Institution takes place on February 24th at the Savoy Hotel.

Accommodation for this function is strictly limited, and if your readers are to avoid disappointment I should strongly advise them to take the earliest possible opportunity of securing their tickets.

J. T. KEEPING,
Secretary, Electrical Trades Benevolent Institution.

9, Southampton Street, W.C.1.
February 5th, 1932

Jerry Wiring

I feel that the letter in your issue of February 5th under this heading calls for comment. Although I am not a member of the E.C.A., I am a member of the National Register of Electrical Installation Contractors, so I need explain my capabilities no further.

First, Mr. Ticehurst says: "I have been bitten on several occasions, so do the work myself with the help of a boy." I suggest that it is only a question of paying the right money; I find no difficulty in obtaining first-class labour.

Apparently Mr. Ticehurst confirms Mr. Tippins's condemnation of the supply companies in your issue of January 8th, but I must maintain from a long experience with the supply authorities in north London that this is entirely unjustified. I find that contractors only need to establish good relations with the supply companies, which must rest with themselves, that is, upon their reputation.

It is something like purchasing a car. If the car is of a well-known make it is purchased, more or less, on the merits of its predecessors, and the reputation of that particular car. On the other hand, if the car is of an unheard-of make the purchaser naturally goes into details much more closely.

I think that if Mr. Ticehurst was to have occasion to carry out a contract in North London he would receive the utmost courtesy from the supply companies, but unless the work was carried out up to a standard it would not be passed. On the other hand, the supply company would give him every assistance to enable him to bring this work up to the required standard.

I will conclude my letter, as Mr. Ticehurst did his, with the hope that in future contractors who are not members of the E.C.A. will not all be classed as "jerry wiremen."

A. S. PLATER.

Harringay, N.4., *February 6th*, 1932. (A. S. Plater & Co.)

Your correspondent, Mr. J. Ticehurst, in the letter published in your February 5th issue, states that the handyman is a great danger. In what way? Does Mr. Ticehurst think that the trade suffers from his activities. I have seen festoons of flexible wire strung across rooms and yards which have been placed there by professional men who have relied upon pieces of string to hold the wire in position; joints in cables simply twisted together and taped up without being soldered, the cable then being pulled into conduit and hidden from view; and installations earthed with a wire no thicker than the main fuses.

Then we have recently had thrust on the market wiring accessories which depend on spikes piercing the covering of a cable for making a connection thereto and plug sockets which allow of unlimited appliances being connected to one outlet. What happens when all these or even half these temporary circuits are in use; unless the circuit wires from outlet to fuseboard are exceptionally heavy, something will be rather overloaded.

Why shout about the handyman who does his own work when such things as the foregoing are practised by the members of the trade? If the handyman does a job for himself he has to buy his material from the contractor, so the latter is not much out of pocket, if a man is compelled to do his own jobs because of high prices. If he were stopped from doing them it would simply mean that the job would not be done at all, so the contractor would not have the chance of selling him the material, and the result would be reflected in the contractor's balance sheet.

If, as Mr. Ticehurst says, the supply companies were to inspect the installation in course of its erection it would not matter who did the wiring, whether professional or amateur; bad work would very soon disappear. Also it would be a big help if the companies examined the installation periodically after connection to see that no connection of other circuits had been made without notification, and that the general wiring was up to scratch. They could also point out to the consumer any defects which were likely to occur in some of the nasty cheap accessories which some people delight in buying.

AMATEUR.

February 7th, 1932.

Iceland Asks for Small Generators

I am in receipt of inquiries for the names of firms offering small direct-current dynamos. The machines required are of the compound-wound type, for direct lighting purposes, driven either by water-power or oil engine.

The voltage would probably be 220, but the range from 50 to 220 V would be acceptable. A power range of from 500 W to 5 kW would cover most requirements. It is necessary for the machine to be of sound quality, but there is little hope of doing any business unless the price is very competitive, as German dynamos of reputable make are so cheap here.

As it takes so long for letters to get to Iceland from England, it would be best if firms sent quotations direct to me at the British Vice-Consulate, Akureyri, Iceland. I will then pass them on to the inquirers. Quotations should be f.o.b. Hull or Leith.

I might mention that the prices of the German goods appear to be far below those ruling in England, so far as I am aware of the latter. Many Continental firms quote specially low rates for Iceland, so that we often find difficulty in competing, but now the rise of the mark in Iceland gives us a better chance, as the Icelandic krónur keeps level with the pound.

I shall be obliged to you if you will assist me in my endeavours to introduce more British goods to the Icelandic market.

ARTHUR GOOK,
British Vice-Consul.

Akureyri, Iceland, *January 18th*, 1932.

Opportunity

"D.P.'s" letter in your issue of January 29th leaves me wondering whether he has really pondered over his own remarks, because I am confident that when he secures that advancement of which he believes himself capable, he will reflect as to what measure of amusement he provided his "big brothers" on this occasion.

The station which he visited where questions must go unanswered is, I am sure, an exception. It is incredible that any charge engineer would permit himself to be incapable of answering any reasonable question on any item of his plant, although to reach this stage in some plants is no mean achievement. In some cases if it is at all possible it is a feat of memory to retain the detail.

As capacity advances the charge man must of necessity be more aloof in order to be able to view the job in perspective rather than flounder about in a promiscuous heap of detail. Again, the calibre of the assistant with which it is possible to carry on in the smaller station does not suffice for the larger job as he cannot receive the supervision to which he is accustomed.

As for telephones, blue prints, and the more extensive staff referred to, I can only declare that if "D.P." attempted to carry out his duties in a super-station in the manner to which he is accustomed, in three months he would be (*a*) Bald; (*b*) Favourite for the Marathon; and (*c*) "Up against" the more capable assistants.

In three hours he would be (*a*) Exhausted; (*b*) Unready for the next development; and (*c*) Still unable to find the wood for the trees.

There are still power plants in the "super" class where, in spite of very capable assistants, it is essential to keep in touch with as much detail as is humanly possible but, to be on the job every time is impracticable. It is becoming a real difficulty for managements to find the man who is at once old enough to have accumulated sufficient experience and young enough to "stay the pace" for the full eight hours, hence 'phones, &c.

HUNDRED UP.

February 5th, 1932.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Drawing-in Fish Wires

"Beacon" fish wires in standard 60-ft. lengths have recently been marketed by MESSRS. BRUNTONS (MUSSELBURGH), LTD., Scotland, for the use of wiremen for drawing cables through metal conduits. They are made from special "Bruntonised" non-rustible, high-strain, No. 16 s.w.g. steel wire having a breaking strain of 110 tons per sq. in., and although flexible they will resist "kinking" to a very considerable extent.

Brunton fish wire

At one end of each coil there is a small fitting which enables the wire to be pushed easily through the tubing. The use of such equipment is certainly to be recommended against the common practice of employing any piece of wire, which often involves waste of time searching for it.

Distilled-water Carrier

A useful device for the electrical department of motor-vehicle service stations and radio-battery charging establishments has lately been put on the market by MESSRS. BROWN BROS., LTD., Great Eastern Street, E.C. It takes the form of a distilled-water carrier and siphon filler which enables accumulators to be topped-up without any waste, and at the same time avoids any slop and consequent mess. The filler, which is portable, is made in half- and one-gallon sizes.

Shop-window Reflector

Outstanding features of the "Unalite" shop-window reflector recently put on the market by the UNALITE CO., 57, Theobalds Road, W.C.1, are that it is all-metal and entirely of British manufacture, it being made exclusively for the company by the Revo Electric Co., Ltd. It is made of copper, chromium plated inside, and it has a matt-finished exterior. By a special process of faceting the reflection is improved by at least 25 per cent. The design is such that when in position the "back" of the reflector is vertical, so that light is not projected beyond the window, but down on the goods displayed close to the window below the fitting.

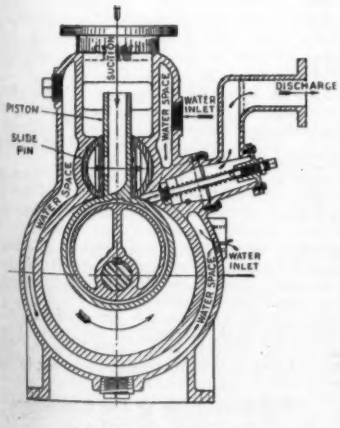
The "Unalite" reflector

Battery Safety Switch

MR. C. V. DESIDERIO, 143, Whitfield Street, W.1, has recently introduced a safety switch for use in connection with the accumulator batteries of motor vehicles. It is of the screw-in-and-out type, and is intended to be fitted near the battery and across one of the main cables. It is claimed not only that current losses are avoided, but also that, if the switch is fitted in an inconspicuous place, it will render the car thief-proof in ordinary circumstances. Although primarily intended for motor vehicles with coil ignition, a model is also made for magneto ignition which, when disconnecting the battery, "shorts" the magneto. The switch is mechanically and electrically robust.

A High-vacuum Pump

A vacuum of within 0.05 mm. Hg. of absolute on closed systems is claimed to be consistently obtained by means of the Kinney high-vacuum pump, produced by the GENERAL ENGINEERING CO. (RADCLIFFE), LTD., Station Works, Radcliffe, Manchester. The mechanism is illustrated in the accompanying drawing.



A high-vacuum pump

On a shaft are mounted two cams at 180 deg. apart, which support pistons with hollow arms which slide freely on a pin. The shaft in rotating carries the cams round, and a rotary plunger motion is given to the inside of the cylinder. This motion tends to create a vacuum behind the piston and draws in air through the hollow slide; at the same time the air in front of the piston is forced out through the discharge valve and separator tank to atmosphere.

Immediately before the piston comes to its highest position the diagonal slots in the hollow slide, through which air is drawn into the cylinder, are closed by the slide pin forming a mechanically operated suction valve. Re-expansive clearances have been reduced to a very small amount, and no internal packing is used. The piston and parts required to be air tight are oil sealed, and at each revolution all oil is discharged together with the air to a separator.

Room Thermostat

The "Satchwell" Type K room thermostat recently introduced by the RHEOSTATIC CO., LTD., Slough, Bucks, has been designed to overcome any objections to unsightly instruments in living rooms, &c. Small and artistically shaped, it is designed for the control of all forms of space heating, and is particularly suitable for working in conjunction with electrically operated valves, oil-burner controls and electric relays for various types of heating installations. It is very sensitive and will give regulation within plus or minus 1 deg. F. in correctly designed installations. Consideration has been given to consistent and reliable operation and long life, and the mechanism is all-metallic and follows the principles embodied in other "Satchwell" thermostats. The entire mechanism is enclosed in moulded "Bakelite," delicately finished in mottled walnut. An added refinement is the incorporation of an unbreakable mechanical thermometer, which accurately indicates air temperature against a graduated scale. Temperature setting can be instantly adjusted over a range of from 50 deg. to 80 deg. F. by the small lever provided, and, in addition, adjustable stops can be arranged to limit the travel of the adjusting lever to the temperature settings considered most desirable for day and night conditions. When these stops have been set at the desired temperature settings, it is then only necesary to swing the adjusting lever hard over in either direction to obtain the day or the night setting. The words "Day" or "Night," together with the actual temperature setting in degrees F., appear in small windows in the front cover of the instrument. The capacity of the thermostat is 1.0 A on a.c., and 0.5 A on d.c.

"Satchwell" Type K room thermostat

Non-padded Flexible Cord

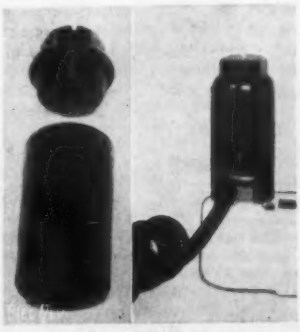
The receipt of a sample of "Goltone Akros" flexible cord recently introduced by MESSRS. WARD & GOLDSTONE, LTD., Frederick Road, Pendleton, Manchester, reminds us that, so far as we are aware, for many years there has been no outstanding improvement or novelty introduced in the make-up of flexible leads of the type used for radiators, portable appliances, &c. In the new cord the conductors each have an extruded insulation of such contour that when the two are placed together the final braiding provides the desired outer finish and shape without the necessity of padding. A disadvantage of cotton filling is, of course, that in damp situations it absorbs moisture. The result is a flexible with high insulating, shockproof, and non-kinking properties, and of smooth and attractive finish. The price of the new cord is about the same as that of the flexible padded type.

"Goltone Akros" flexible

Terminal Protector

A new terminal insulator has been produced by the WESTINGHOUSE BRAKE & SAXBY SIGNAL CO., LTD., 82, York Road, King's Cross, N.1, to provide electrical protection for terminals and to prevent short circuiting of, or unauthorised interference with, relays, fuse boxes, terminal blocks, &c.

It consists of a black fibre sleeve with a "Bakelite" cap which, when screwed down on the terminal, holds the sleeve rigidly in position, so that the terminal is completely surrounded by insulating material, except for the slot for the incoming leads. The device can be made for any diameter or length of terminal.



Westinghouse terminal protector

Power from the St. Lawrence

BY OUR CANADIAN CORRESPONDENT

THE proposed development of the international section of the St. Lawrence River continues to be the outstanding subject of discussion in Canada at the present time, and an important conference has just been held in Ottawa, those present including the Canadian Prime Minister, the Canadian Minister to Washington, the United States Minister to Canada, and the Premier of Ontario, as well as members of the Hydro-Electric Power Commission of Ontario, the Water Powers Branch and the Department of Railways and Canals.

One important question which has been under discussion for a long time was settled. The province of Ontario has all along claimed that the right to develop water power in the international section of the St. Lawrence River belonged to it. Under the last (Liberal) Government this right was disputed on the ground that it belonged to the Dominion Government. The present Conservative Government, however, has just conceded that the right belongs solely to Ontario. In the United States a somewhat similar situation exists between the Federal Government and that of New York State.

Apportionment of Costs

Another matter which apparently has been settled is the question of the apportionment of costs for navigational works and power development respectively. Navigation matters rest solely in the hands of the Dominion Government, and a suggestion that the entire costs of the works should be charged to power development has been receiving a certain amount of support. According to the daily papers, however, it has now been decided that the expenditures will be kept quite separate.

Navigational and power works will be undertaken simultaneously; the former will be paid for by the Dominion Government and the latter, carried out by the Hydro-Electric Power Commission of Ontario, will be paid for out of revenue from the sale of electricity.

Opposition from Quebec

The attitude of the province of Quebec, which contains the all-Canadian section of the River, is one of opposition to the development of the international section either at the present time or in the near future. This position is probably due to the fear that both Montreal and the city of Quebec would suffer if ocean-going steamers could go right up. There is also some opposition from the railways. Practically all the big hydro-electric power companies of Canada have their headquarters in Montreal, and in the circumstances it is not surprising that Quebec asks for the development of power on the all-Canadian section of the St. Lawrence River first.

The American Attitude

As an offset to the opposition shown by Quebec is the fact that the State of New York could probably absorb all its share of the power within a very short time; in Ontario the process would be likely to take somewhat longer.

There are, however, conflicting interests in New York State. The power is, or soon will be, needed, but navigation along the whole length of the St. Lawrence would injure the Erie Canal and some of the railway lines of New York State, both of which carry a good deal of Canadian freight to Atlantic ports in the United States.

Farther west, the power question is of no account, but those who have grain and other commodities to export or who import merchandise are in favour of navigational works being carried out.

Agreement in Sight

Following on the conference in Ottawa referred to above, it has just been reported that a statement of the Canadian position on the proposal to develop the international section of the St. Lawrence has been laid before the American authorities for consideration. It is further stated that the position taken by Canada was acceptable to the United States in all of its fundamentals. Questions arose only in connection with some of the minor technical phases of the development.

It is expected that a public declaration that an accord has been reached will be made very soon. This accord will make possible the drafting of a treaty between Canada and the United States, which, it is hoped, would be ratified during the current session of Congress in Washington and the approaching term of Parliament in Ottawa.

Indian Electrical Notes

BY OUR INDIAN CORRESPONDENT

Demand for Cheaper Electricity

THE rates charged for electricity in the United Provinces have been the subject of complaint among the people in that province, so much so that a special resolution demanding a reduction in the rates was moved in the Legislative Council, and was withdrawn only on an assurance by the Government that a full inquiry would be made and that a permanent board would be appointed, if necessary, to look into the matter.

The Bombay-Calcutta Telephone

A high-frequency four-channel system of telephony is being installed between Calcutta and Bombay, and is expected to come into operation before the end of next month. The system will consist of repeater stations at Raipur, Jhursaguda, Nagpur, and Bhusaval, and will be operated over a pair of wires that are being balanced and transposed for a direct telephone connection between the two cities.

In addition, a parallel pair of wires is being prepared to act as a stand-by circuit in case of breakdown of the main circuit. Should this occur, the carrier system will be switched over to this spare pair, which when not so used will be employed as an intermediate telephone circuit serving the towns between Bombay and Calcutta. The new arrangement can provide two physical telephone circuits, three carrier telephone circuits, and telegraph channels.

Radio Research in Bengal

Professor Mitra, of the Calcutta University, in a paper read before the Indian Science Congress, has described the results of his investigation regarding the estimation of the height of the conducting radio atmosphere in Bengal. The height has been found to vary between 45 miles in the evening to 60 miles in the early morning. These heights were lower by about 30 per cent. than those found for England.

In order to obtain more accurate information regarding the properties and position of this conducting layer, Professor Mitra has recently been experimenting with echoes of wireless waves for the estimation of the height. This method of measuring the height of the conducting layer is an adaptation of a method which has recently been developed by Professor Appleton in England.

Abnormal Echoes

One of the surprising features of these echoes was that sometimes they were found to be stronger than the signals directly received, and, further, that very often one received instead of a single echo, a number of echoes, two, three, or four in number in quick succession. The abnormal strength as well as the multiplicity of these echoes was most pronounced during the period immediately preceding sunset. The investigation is being actively pursued in Calcutta, and the results will be announced shortly.

A Russian Tribute to Faraday

AT the risk of causing unrest in the electrical industry, we reprint below a manifesto published by our contemporary *Electritchestvo* upon the occasion of the Russian Faraday celebrations:—

TO ENGLISH PROLETARIANS.

The solemn conference of the scientific and social organizations of Moscow in the centenary of the discovery of the law of electro-magnetic induction send their greeting to the English proletariat whose rows breeded the founder of the electrical science, the father of modern technics Michael Faraday.

The teachers of the International Proletariat Marx and Engels in virtue of their genius came to full understanding of the revolutionary power of electricity witnessing the first steps of the application of the doctrine given by Faraday.

The great leader of the world workers Lenin personally directed the ellaboration of the first plan for the electrofication of USSR. The proletariat of the Soviet Union under the leadership of the Lenin Communist Party That has taken the plan of electrofication for then second program, looks critically at the scientific and thechnical experience accumulated by mankind and reconstructs with full success its national economy on the base of industrial, most advanced technics.

Following Stalin's slogan the workers of the Soviet Union gain proficiency in technics where Faraday's ideas will for a long time serve as a powerful revolutionary tool of technical development.

The capitalism is powerless to realize the doctrines of Faraday and of the other great scientists for the benefit of the working masses which is most clearly manifested in the deep world crisis thah has embraced all capitalists economics.

It is only the triumph of the proletarian revolution thah will break down the shackles that chain the technical progress of humanity and afford boundless possibilities in the farther use of electricity where the first steps were made by the celebrated Faraday.

The Presidium of the Conference

United States Electrical Exports

THE United States Government has issued its annual statement of the country's export trade in 1930 showing countries of destination and classifying the commodities in great detail. From this statement the following tables have been compiled showing the exports of electrical machinery and apparatus and the principal countries of destination (omitting Cuba and the Philippines which, although fairly important markets for American electrical goods, are unlikely to prove of interest to British exporters). A column showing increases or decreases as compared with 1929 has been added except in a few instances where the classification has been modified, and strict comparison is not possible.

	1930. Thous. $.	Inc. or dec. compared with 1929.
Generators—		
D.c., under 500 kw (total)	744	− 553
To Canada	233	− 114
„ Soviet Russia	66	+ 40
„ Mexico	49	− 104
„ Brazil	21	− 19
„ Venezuela	48	+ 20
D.c., 500 kw and over (total)	462	− 401
To Mexico	126	− 195
„ Newfoundland	119	+ 119
A.c., under 2,000 kvA (total)	313	+ 17
To France	31	+ 31
„ Soviet Russia	59	+ 40
„ Canada	44	− 69
„ Argentina	32	+ 23
„ Brazil	21	+ 6
A.c., 2,000 kvA and over (total)	664	+ 352
To Spain	425	+ 425
„ Nicaragua	24	+ 24
„ Mexico	47	+ 47
„ Brazil	25	+ 25
„ Japan	70	− 86
Steam turbine generator sets (total)	1,597	+ 573
To Soviet Russia	301	+ 301
„ Canada	180	− 92
„ Argentina	559	+ 549
„ Venezuela	90	+ 72
„ Japan	116	− 143
Self-contained lighting outfits (total)	846	− 345
To United Kingdom	143	− 29
„ Canada	97	− 118
„ Argentina	122	− 8
„ Chile	47	+ 22
Accessories and parts for generators	708	− 272
Batteries—		
Radio B. and C. batteries (Principally to Argentina and New Zealand)	578	− 455
Flashlight batteries (Principally to Argentina, India, Malaya, China, Dutch E. Indies, Hong Kong and Siam)	3,618	+ 152
No. 6 dry cell batteries (Principally to Argentina and China)	577	*
Other primary batteries	267	*
Six-volt storage batteries (Principally to Argentina, India and South Africa)	1,815	*
Other storage batteries (Principally to United Kingdom, Canada, Chile and South Africa)	1,293	*
Transforming and converting apparatus—		
Distribution transformers, less than 500 kvA	1,864	+ 566
Instrument transformers	237	+ 82
Power transformers, 500 kvA and over	2,010	+ 659
Other transformers	1,178	− 272
Rectifiers, double current, and motor generators, dynamotors, synch. and other convertors (total)	1,152	− 126
To Soviet Russia	70	+ 54
„ United Kingdom	103	+ 80
„ Canada	320	− 57
„ Mexico	52	− 3
„ Argentina	128	+ 81
„ Brazil	65	− 120
„ Chile	113	+ 68
Transmission and distribution apparatus—		
Switchboard panels, except telephone	2,156	+ 973
Switches and circuit breakers, over 10 A	2,390	+ 131
Fuses	377	− 197
Watt-hour and other measuring instruments (total)	726	− 540
To Canada	90	− 13
„ Mexico	91	+ 11
„ Brazil	75	− 214
Indicating instruments (total)	835	+ 134
To Canada	188	− 7
Recording instruments (total)	447	+ 121
To Canada	80	− 11
Other testing apparatus (total)	920	− 128
To Canada	419	− 26
Lightning arrestors, choke coils, etc. (total)	851	− 144
To Japan	142	− 95
„ Canada	85	+ 25
Motors, starters, and controllers—		
Motors, ¼ h.p. and under (Principally to Canada, United Kingdom, France and Germany)	2,413	− 285
Motors, under ½ and over 1 h.p. (Principally to Canada, United Kingdom and Germany)	658	− 120
Stationary motors, 1–200 h.p. (total)	3,391	− 860
To Soviet Russia	692	+ 415
„ United Kingdom	205	+ 54
„ Canada	684	− 291
„ Mexico	335	− 62
„ Argentina	128	− 640
„ Brazil	111	− 68
„ Chile	257	+ 55
Motors, over 200 h.p. (total)	695	+ 297
To Soviet Russia	274	+ 245
„ Canada	73	+ 22
„ Mexico	49	− 10
Railway motors (total)	190	− 105
To Canada	13	− 4
„ Chile	63	+ 54
Starting and controlling equipment—		
For industrial motors	1,651	− 377
For traction motors	160	− 44
Accessories and parts for motors	2,410	− 1,084
Radio apparatus—		
(Principally to Canada, Mexico, Argentina, Australia and Italy)		
Transmitting tubes, sets and parts	1,144	− 796
Receiving sets	11,550	+10,774
Receiving tubes	2,363	+ 366
Receiving set components	4,375	− 44
Loud speakers	1,636	− 653
Other receiving set accessories	2,066	− 634
Telegraph apparatus (total)	764	− 307
To Canada	265	− 226
„ Japan	52	− 59
„ Germany	66	− 9
Telephone apparatus—		
Telephone instruments	526	− 455
Telephone switchboards	953	− 673
Other telephone equipment	3,895	− 66
Locomotives—		
Rly. (total)	866	+ 211
To Chile	806	+ 798
Mining and industrial (total)	736	+ 270
To Canada	189	+ 111
„ Chile	90	+ 35
Electrical appliances—		
Fans (total)	1,052	− 135
To United Kingdom	82	+ 53
„ Canada	167	− 33
„ Argentine	227	+ 15
Household washing machines (total)	1,710	− 290
To Canada	897	− 311
„ United Kingdom	197	+ 35
Vacuum cleaners (total)	1,724	+ 236
To United Kingdom	1,065	+ 367
Other motor-driven household devices	820	*
Cooking ranges	444	+ 90
Other domestic heating and cooking apparatus	1,010	+ 3
Industrial elec. furnaces and ovens	863	+ 378
Metal fil. lamps (not for cars or flashlights) (total)	1,017	*
To Mexico	114	*
„ Chile	98	*
Household refrigerators	8,236	*
To Belgium	695	*
„ France	395	*
„ Germany	350	*
„ United Kingdom	850	*
„ Canada	1,245	*
„ India	390	*
„ South Africa	390	*
Other electrical apparatus—		
Sparking plugs (total)	1,702	− 396
To France	635	− 125
Other ignition apparatus	1,366	− 480
Metal conduit, outlet and switch boxes	1,209	− 340
Insulating material	1,123	− 372

* Comparative figures not available.

"Loudaphones"

AS their name implies, these telephones have a high-pitched musical calling note and reproduce speech loudly and free from extraneous interference, which makes them very suitable for use amid noise and in exposed situations. The range of very robust instruments made by Clifford and Snell, Ltd., includes entirely weather-proof models housed in universal cases with interchangeable front covers made of metal.

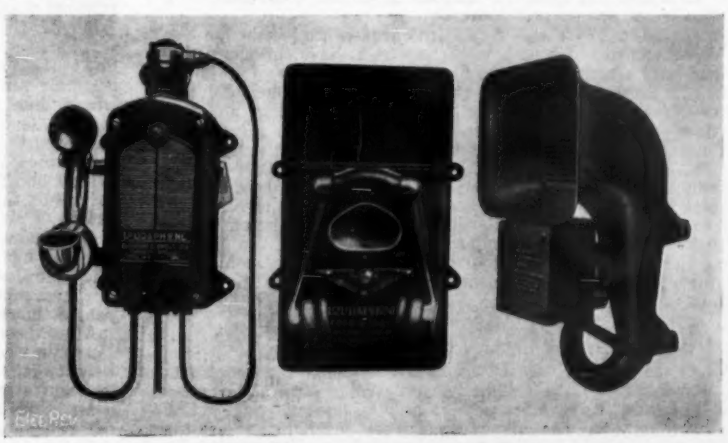
The transmitter, of the double-acting type, consists of brass front and back electrodes separated by a washer and both screwed to a solid "Bakelite" ring so moulded as to afford good insulation. On the other side of the moulding is a heavy brass ring which clamps the diaphragm in position, the latter being completely insulated from the live members and serving a mechanical purpose only.

The receiver construction is simple; a base carries the non-ferrous diaphragm (the frustrum of a cone), the cobalt-steel permanent magnet and coil, and pole-piece assembly.

A transformer serves the dual purpose of converting the microphone current into speech current for transmission, and also the high-speed interrupter current into high audible frequency current for producing a musical call note at the distant receivers. The primary and secondary windings are well insulated on a moulded "Bakelite" spool.

Also of unit construction, the rocking switch used is simple, rugged, and self-cleaning. Depression of one side actuates the "call-up," while depression of the other side permits the transmission of speech. In addition, other series of instruments are fitted with a change-over switch that diverts speech from the loud-speaker when the side-arm earphones are raised, or closes the speaking circuit when the hand transmitter is lifted, as the case may be. The call-up is effected by depressing a separate lever in the latter case.

A rotary ball-controlled switch selects the "stations" to be spoken to; one position enables a message to be broadcast to all receivers simultaneously and another allows the user to speak to his own instrument for testing, thus eliminating the necessity for an assistant. When the speaking switch is closed indirect illumination of the engraved station names prevents mistakes at night. A "called-up" lamp indicator can also be fitted.



Three examples of "Loudaphone" apparatus

Parliamentary Notes

BY OUR SPECIAL REPORTER

The Balance of Trade

Parliament reassembled on Tuesday, February 2nd, and on that day Mr. Hore-Belisha, Parliamentary Secretary to the Board of Trade, moved that the House approve the Third Order made, on December 17th, 1931, under the Abnormal Importations (Customs Duties) Act. He gave figures showing the beneficial working of the Act, and said the Orders made under it had actually saved from the market £5,235,000 sterling worth, which represented the reduction of the importation of the articles included in these Orders.

Our exports, on the other hand, had increased, and during the last six weeks notifications had been made to the Industrial Adviser at the Board of Trade by no fewer than 200 foreign firms wishing to set up factories in this country, and in 21 cases production had actually begun.

Lighting Fittings Imports

Mr. T. Williams, a Labour member, in opposing the Orders, asked what abnormal quantities of illuminating glassware had been imported to justify the inclusion of that particular commodity in the Order. As there must be a natural growth in electrical development, and in the use of lampshades and globes, the quantities imported last year were quite normal. For the three Decembers of 1929, 1930, and 1931, the imports were 15,000 cwts., 19,000 cwts., and 16,000 cwts. respectively, while for the three years they were 163,000 cwts. in 1929, 164,000 in 1930, and 174,000 in 1931. We could produce only 4 per cent. of our needs in this connection, and that meant that 50 per cent. duty would have to be paid for a long time to come on an article which we were bound to import.

Col. Applin, on the other hand, said that he welcomed the inclusion of electric globes and fittings, for the factories in his constituency (Enfield) were at present working short time.

Ultimately the Order was approved by 276 votes to 44.

The Government's Protection Proposals

On February 4th, Mr. Neville Chamberlain unfolded the Government proposals for redressing the adverse balance of trade, which, he said, taking into account invisible exports, amounted to £113,000,000.

The principal aims of the Government were: To correct the balance of payments by diminishing imports and stimulating exports; to fortify the finances of the country by raising fresh revenue by methods which would put no undue burden on any section of the community; to effect an insurance against a rise in the cost of living; and, by a system of moderate protection, to transfer to our own factories and fields work which was now done elsewhere, and thus increase employment.

The Government meant also to use this system of protection for negotiations with foreign countries which had not hitherto paid very much attention to British suggestions. It was also going to take the opportunity of offering advantages to the countries of the Empire in return for the advantages they might be disposed to give them.

Outlining the Government's proposals, Mr. Chamberlain said that the basis was a general tariff of 10 per cent. on all imports, with the exception of a short free list. The 10 per cent. would not be added to existing duties.

Duties of Advisory Committee

A Tariff Advisory Committee would be set up, which would consider whether higher duties might not be imposed on certain luxury articles or on goods which could be produced in sufficient quantities at home.

Neither the new general duties nor the new specific duties would apply to Dominion goods, pending the Imperial Economic Conference at Ottawa next July.

If foreign countries discriminated against British goods, the Board of Trade would have power to impose duties up to 100 per cent. on their goods. But, after the Ottawa Conference, there would also be power to offer reciprocal lowering of tariff barriers to good foreign customers.

During the discussion Sir Herbert Samuel (Home Secretary) stated the Free Trade case against the proposals.

The Anglo-Argentine Tramways

In the House of Commons on February 8th, Lord Scone asked the Foreign Secretary if he was aware that the Anglo-Argentine Tramways Co., Ltd., had been forced to default in the payment of interest and dividends by the refusal of the Argentine authorities to sanction the charging of increased fares by the company, which was still working under arrangements made in 1908.

Mr. Eden said the Government viewed with concern the progressive deterioration in this important company's position. The British Ambassador, acting under instructions, had frequently drawn the attention of the Argentine Government to the hardship caused to numerous investors by reason of the continuance of present conditions, but unfortunately no progress appeared to have been made by the Commission which was dealing with the matter.

Legal

A Remuneration Dispute

IN the King's Bench Division on February 3rd, Mr. Justice Maugham concluded the hearing of an action by Messrs. Drake & Gorham, Ltd., against Mr. H. L. Tett, Bickley, Kent, to recover money advanced to him. There was a counter-claim by the defendant.

Mr. Pritt, K.C., for the plaintiffs, said that the defendant had been employed by the plaintiff company, and at the end of his employment there was a dispute over the remuneration. The plaintiffs said that the defendant had been paid money on account of his remuneration, which was mainly to be his share of the profits, but as there had been no profits he should pay that back and also money advanced to him for legitimate purposes. Defendant, in reply, said that the agreement in the first place was 10 per cent. on orders and that that agreement was still in force. Counsel said that there had been five different systems of remuneration.

Evidence was given by Mr. M. E. Drake, joint managing director of the plaintiff company.

Mr. Morris, for the defendant, argued that although the defendant received £4 a week he was to have the share that had been arranged between him and plaintiffs.

His Lordship, in giving judgment, said that he held that the agreement as to the defendant having a salary and one-third of the turnover continued. In his opinion it would be fair if defendant received remuneration during the period in question at the rate of £600 per annum. The £4 per week which the defendant had received would have to be deducted, and the defendant was to account for the whole of his drawings and overdrawings during the period. That sum would have to be set off against the amount awarded.

The parties were unable to arrive at an agreement as to the figures, and his Lordship said he would hear the matter out at a later date.

Alleged Electrical Fire

IN the King's Bench Division, Mr. Justice Wright continued the hearing of the action by Geo. West, Ltd., and Express Rubber Co., Ltd., Mortimer Street, W., against Griggs & Son, building contractors, claiming £25,400 for damage resulting from a fire which broke out on April 22nd, 1929 at premises in Portman Mews North, which at the time were in the occupation of the defendants for the purpose of reconstruction. Plaintiffs occupied adjoining property, and their case was that there had been negligence on the part of the defendants in laying certain electric wires without protective tubing, and that the wires were in too close proximity to inflammable material which composed a partition erected temporarily to divide plaintiffs' premises from those under reconstruction.

Evidence was called to show that at the point where the cable came through the screen it was wound round with insulating tape, and that the temporary electrical installation was perfectly done in the ordinary way and there was no risk of fire.

Dr. Oscar Faber said that it was impossible to say whether it was caused through electrical action or not.

Another witness said that on his visits to the garage on the ground floor of the premises he had seen a paraffin oil stove, which was filled from a two-gallon tin.

The case was concluded on February 8th, when Mr. Justice Maugham reserved judgment.

Supply Company Sued

In the King's Bench Division on February 4th Mr. Justice Bennett commenced the hearing of an action by Mr. Thomas E. Poole, Brightlingsea, and Mr. Wm. T. Warren, Brightlingsea, against the Frinton-on-Sea & District Electric Light and Power Co., Ltd., claiming damages from the defendant company for loss occasioned to their property by reason of a fire which they alleged was caused by the defendants' exhaust pipe at its generating station on February 21st, 1930, which destroyed the premises and stores contained therein. Plaintiffs complained that the defendants had flooded their land with oil and had removed the mufflers from the exhaust pipes with the result that sparks or flames were emitted, damage to the extent of £1,200 being caused.

Defendants denied that they had flooded plaintiffs' land with oil, but had only sprayed it with oil under an agreement. They pleaded that they had made alterations in the exhaust pits and pipes with the view of mitigating any danger, and denied that the fire was due to any negligence on their part.

After discussion it was agreed that the only issue for his Lordship's decision was one of liability. If his Lordship found liability on the part of the defendants, then the matter could go to a referee, or the parties might be able to settle it.

Mr. Roland Oliver intimated that his defence was that the fire originated in the plaintiffs' buildings, and evidence was called to support the proposition that the fire started outside the stores and near the ground opposite the exhaust pipes. Other evidence was called in support of the allegation that sparks, "burnt carbon," came from the exhaust pipe, and that the oil overflowed the land near the stores.

The hearing is proceeding.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The British Industries Fair

It is announced that the principal speaker at the luncheon on the first "electrical" day at the Birmingham Section (February 24th) will be Major D. J. Colville, Parliamentary Secretary to the Department of Overseas Trade. At the March 2nd luncheon (the second "electrical" day) Mr. P. J. Pybus, the Minister of Transport, will be the chief speaker; he will be accompanied by Sir Cyril Hurcomb, Permanent Secretary to the Ministry of Transport, Col. Heneage, Parliamentary Secretary, and Sir John Brooke, Vice-Chairman of the Electricity Commission.

McGeoch's Hundred Years

Messrs. William McGeoch & Co., Ltd., Glasgow and Birmingham, celebrate their centenary this year—not, of course, as electrical manufacturers, for when they started business in 1832 it was as wholesale ironmongers and hardware merchants. Later they added the production of ships' brassfoundry, oil and candle lamps, and electrical supplies, to their activities.

In 1887 the "Warwick" works, Birmingham, were acquired, which placed the firm in command of manufacturing facilities which have since been largely extended. Branch offices and showrooms have also since been opened in London and Newcastle-upon-Tyne. Thus by degrees the firm assumed its present scope, embracing the production of Admiralty material, fittings for home and Colonial railways, and the principal steamship companies, ships' brassfoundry, electric lighting fittings, lampholders and accessories.

Messrs. McGeoch were pioneers in the introduction of electrical fittings into ships, electrical attachments to lamps having been applied before electrical fittings came into general use.

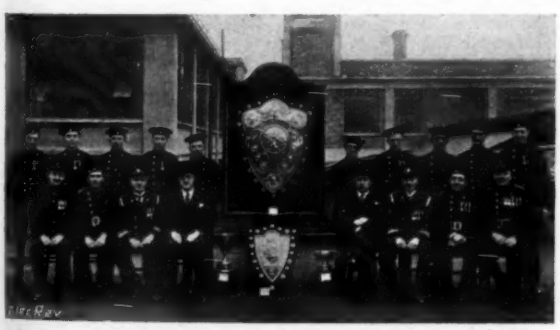
We congratulate the company upon reaching a ripe old age while still retaining its youthful vigour.

Floodlighting in the Strand

An interesting floodlighting installation has recently been carried out at the Strand premises of the Civil Service Supply Association. The front of this building has been entirely rebuilt and a floodlighting scheme for it was designed by Siemens Electric Lamps & Supplies, Ltd., Siemens floodlighting projectors and gasfilled lamps being used. The wiring contractors were Messrs. Rashleigh, Phipps & Co., Ltd.

The "Standard" Fire Brigade

The Woolwich factory fire brigade of Standard Telephones and Cables, Ltd., has a fine record of successes in private fire brigades' competitions during 1931. The trophies secured by this brigade, and shown in the accompanying illustration, include the Corporation of London's Silver Challenge Shield, for which there was a dead-heat with the Midland Bank for



"Standard" firemen with their trophies

first place, the Hitchcock Shield for the two-men drill for London brigades, the Nestlé Cup for the championship of the United Kingdom, and the Achille Serre Cup for five-men drill for London brigades. The Hendon and Southgate brigades of the company have also been very successful in the private fire brigade competitions in recent years.

The Irish Contractors' Dinner

The Dublin Branch of the Electrical Contractors' Association held its annual dinner on February 1st. The chairman, Mr. A. G. Bruty, was prevented by influenza from being present, and Mr. McConnell presided. Mr. F. R. Unwin, proposing the toast of the E.C.A., reminded the company that Dublin was the birthplace of the Association; Mr. Arthur E. Porte, Mr. Christopher Cummins, and the late Mr. J. Edmondson were the originators of the idea. He regretted that the opposition offered by the E.C.A. to the trading clauses in the Irish Act had not been so successful as the fight put up in England. In fact, there was no legal limit to the trading activities of the Board, except the proviso—after all, a very important one—that such activities must pay their way.

The organised contractors in the I.F.S. negotiated for a long time with the Board during and after the passing of the Act, but could come to no sort of working arrangement. He thought that the recent increase in rates of charge would have a definitely bad effect upon the whole national undertaking.

Mr. R. F. Browne, the chairman of the Electricity Supply Board, said that the electricity scheme was already upon a very substantial basis, and the tendency of rates of charge would be definitely downwards.

Col. H. E. O'Brien, chairman of the Irish Centre of the I.E.E., responding for the guests, hinted that sooner or later there would be granted to the I.E.E. in Ireland a greater degree of autonomy than it possessed at present.

Lighting of a Folkestone Store

The new premises of Bobby's, Ltd., in Sandgate Road, Folkestone, which were opened last March, have a total frontage of 148 ft., and give full scope for well-lighted window displays. A wrought-iron and glass canopy extends the whole length of the building and provides an arcade (shown in the accompanying illustration) in which there is a maximum window space available for display. In each window there are twelve "Gecoray" reflectors with 60-W lamps, situated behind the pelmets, diffusing a balanced, shadowless light.

A well-lighted arcade at Folkestone

In the ground floor main shopping hall numbers of 14-in. "Britalux" pendant fittings, with 200-W lamps are evenly spaced in each of the three main aisles and give an ample light for all general purposes. The long showcases which also form the counters are illuminated by means of specially designed reflectors equipped with "Striplite" lamps concealed in and under the top framework. The central grand stairway has six two-light decorative wall fittings in chased bronze, each bearing two 100-W lamps in frosted globes.

Local Exhibition

The Electrical Distribution of Yorkshire, Ltd., on February 3rd opened an electrical exhibition at the Miners' Welfare Institute at Dalton. The exhibition continues until February 22nd and cooking lectures and demonstrations of washing, ironing, cleaning, lighting, and heating are being given.

Registered Electrical Contractors

Egginton, F. G., Whitby.
Salter, G., Ellesmere Port.
Speed, E., Widnes.
Davison, W., & Co., Clacton-on-Sea.
Sansom & Capps, St. Margaret's-on-Thames.
Osman, H. G. & A., Ltd., Oxshot, Surrey.
Fidler, J., & Sons, Hollinwood, Lancs.
Marr, A., Bastwell, Blackburn.
Woolliscroft, H. C., & Co., Liverpool.
Norie, J., & Co., Gateshead.
May, J., Leatherhead.
Newth, J., Gloucester.
Thorpe, T. A., Bexhill-on-Sea.

At the same meeting six applications were withdrawn and four were declined.

Radio Valve Manufacture in Australia

Speaking at the annual meeting of Amalgamated Wireless (Australasia), Ltd., Mr. E. T. Fisk, the acting chairman, said that negotiations had been concluded for the establishment of wireless valve manufacturing works in Australia. Under the proposed arrangement a company, to be controlled by Amalgamated Wireless, would be formed which, for a period of thirty-three years, would have the right to all the manufacturing and research experience of some of the largest radio valve manufacturers in the world. Already three members of the staff had been sent abroad for training and experience and to select the necessary machinery.

Czecho-Slovakian Electrical Imports and Exports

The value of imports of electrical machinery and apparatus into Czecho-Slovakia during December amounted to 41,863,000 crowns, bringing the total for 1931 to 371,360,000 crowns. The values of exports for the corresponding periods were 103,418,000 and 1,328,730,000 crowns respectively.

Commercial Travellers' Benevolence

The 44th anniversary festival dinner of the London Commercial Travellers' Benevolent Society was held on February 4th at the Trocadero Restaurant, Piccadilly Circus, W., Sir Hugo Hirst, Bart (chairman) presiding. In proposing the toast to the continued success of the Society, with which he coupled the name of Lord Leverhulme (president), Sir Hugo stated that he held an affection for the commercial traveller as he was one himself at the commencement of his career. He recalled some of his experiences in the days when electrical development was in its beginnings and when it was difficult to know what customers required. Instead of carrying the usual

G.E.C. 1,500-kVA transformers at Mangahao, New Zealand

black bag he used to wear a mackintosh with capacious pockets, and was usually able to produce from one of these the product which the customer required. We were told in the present days of economic crisis that the country had lost the art of salesmanship. No greater libel had ever been perpetrated upon the commercial traveller. Mr. Newman (secretary) announced that the total amount subscribed to the charity was £3,910, the contributors including Sir Hugo Hirst (£250); the trustees of the late Lord Leverhulme trust fund (£525); Lord Leverhulme (£100); and the General Electric Co., Ltd. (£50). Other speakers were Lord Leverhulme and Messrs. S. Barnett, H. G. Hagon (chairman of the board of management), and E. Gowen.

"Monolamp" Fittings now British Made

"Monolamp" indirect lighting fittings, 308, Regent Street, S.W.1, are now being made in this country. The same reflector which enabled this fitting to gain the Gold Medal at the Paris Colonial Exhibition last year is retained.

Local Exhibition

The Chesham Electric Light & Power Co., Ltd., is holding an electrical exhibition at the Town Hall, Chesham. We hope to give further particulars in our next issue.

Recent Contracts

The Synchronome Co., Ltd., has received orders for the equipment of the following premises with its system of electric clocks:—Swansea Technical College; County Buildings, Preston; Lincoln County Offices, Lincoln; London Electric Supply Corporation's new premises, Stamford Street; Messrs. Barratt & Co.'s premises, Wood Green; British General Insurance Co.'s new premises, Cheapside; Greycoat Hospital, Westminster; Linskill School, Tynemouth; and the Criterion Restaurant, W.

Mirrlees, Bickerton & Day, Ltd., have recently received orders for Diesel engines from the following:—The Marconi Radio Telegraph Co., Cairo; the Benguella Estates Sisal Factory; the town of Chapra, India; the Bombay, Baroda & Central India Railway; the Trinidad Electric Co., Ltd.; the Park Tea Estate, Ceylon; the Electricity Supply Company at St. Mary's, Scilly Isles; the Tongaat Sugar Co., Ltd., Natal; Warner Barnes & Co., Manila; the City of Allahabad, India; the Sierra Leone Development Co.; the Indian Radio Telegraph Co.; the Craighead Tea Estate, Ceylon; the Rothesay Corporation; the General Wharfage & Supply Co., Ltd.; the town of Jamnagar, India; Minia Trades School, Egypt; P. Kirk & Co., London; and the Barbados Electric Supply Co.

Trade Announcements

Messrs. Hubert Davies & Co., Ltd., 586, Salisbury House, London Wall, E.C.2, have been appointed sole selling agents for Sanders "Superior" switch- and fuse-gear in the Union of South Africa and Rhodesia.

Kersons Manufacturing Co., Ltd., announces the completion of its new factory at Kingsbury Road, Minworth, Birmingham, to which address all correspondence should now be sent. The telegraphic address remains unchanged, but the telephone number is now "Ashfield 1163-4." The new factory is in the immediate neighbourhood of the British Industries Fair buildings.

Mr. F. W. Berris has commenced business as an electrician and electrical fittings dealer at 173, High Street, Herne Bay.

Turnill, North & Co., Ltd., radio engineers, of Peterborough, have removed their business from Bridge Street to new premises at the Broadway.

Modern Electric Homes, Ltd., have moved to the Tricity Showrooms, Wellington House, Strand, W.C.2 (Telephone: Temple Bar 4767). Callers for "Kye" lamp supplies can in future obtain them from the company's bulk supply stores at 33, Eagle Street, Southampton Row, W.C.2.

For Sale

A freehold factory at Edmonton will be sold by auction on March 3rd, by Messrs. Hillier, Parker, May & Rowden.

(See our advertisement pages to-day.)

A Revised D.O.T. Guide

The Department of Overseas Trade has issued a revised edition of the guide to the services which it offers to United Kingdom firms interested in the development of export trade. The need for expansion of United Kingdom trade overseas is urgent and this booklet, descriptive of the various activities of the Department, will be of particular interest. It is divided into sections relating to standing information, commercial news, economic surveys, the British Industries Fair, and the overseas organisation of the Department. Copies (reference No. C. 3815) may be obtained from the offices of the Department, 35, Old Queen Street, S.W.1.

Conditions in El Salvador

A report by Mr. D. J. Rodgers, H.M. Consul at San Salvador, on the economic conditions in El Salvador, has just been published by the Department of Overseas Trade (Stationery Office, 1s. net). Although various attempts have been made to promote other crops, the country continues to rely on its production of coffee to maintain its foreign trade and a continued decline in exports has resulted in the international purchasing power of the country being halved in two years. British manufacturers are advised to take this state of things into account and not to force goods on importers of slight responsibility. During 1930 the total imports of electrical machinery and apparatus and electrical material amounted to 165,188 and 422,410 colons respectively (9.73 colons=£1 at par), the United States being the principal supplier. The United Kingdom's share of the electrical machinery and apparatus imports show a disappointing decrease from 50,336 to 1,709 colons, and the electrical material imports from this country at 2,274 colons (nil in 1929) were also almost negligible.

Electrical Manufacturing in Russia

According to a recent issue of the *Moscow News*, the Stalin turbine works of the Soviet Government in Leningrad last year manufactured turbines having a capacity of 702,000 kW, as against 420,000 kW called for in the Five-Year Plan. The output included the first turbine of 50,000-kW capacity built in the works. The generators for use with the turbines were constructed at the Electrosila works in the same city, where the electrical machines for three large steel rolling mills were also built. The Sevcabel concern is credited with the production last year of the first 120,000-V cable, while the Electric concern began the production of portable electric welding machines. The Svetlana produced a 50-kW radio valve, and the Krasnaya Zaria a new type of telephone and an improved apparatus enabling several conversations to be carried on simultaneously over the same cable.

Social Events

The employés and staff of Messrs. Mavor & Coulson, Ltd., held their annual dance in the "Ca'Dora," Glasgow, on February 6th. The company numbered over 200, and included Major and Mrs. Jack Mavor, Mr. and Mrs. Eric Mavor, Miss Jessie Mavor, and Mr. G. Buchanan, manager of the East Kilbride works.

The annual dinner of the staff of Ferranti, Ltd., was held at the Midland Hotel, Manchester, on February 5th after a lapse of three years and within a few months of the fiftieth anniversary of the company. Over 300 guests attended the function, including directors of the company, officials of the Central Electricity Board and electrical engineers from several of the supply authorities in Lancashire. Mr. V. Z. de Ferranti, who presided, mentioned that the first dynamo produced by his late father was now in use for radio testing. The last three years had been a very busy period for the company. The new range of electricity meters had involved a great deal of experiment and a new lay-out of the factory plant, with a new foundry. The company in the period under review had put into operation the largest transformers there were in this country. The first 60,000-kW transformer had been installed at Deptford. In Canada they had an estate of 16 acres at Mount Dennis, near Toronto, where they had erected a factory. This concern was operated under the title of Ferranti Electric, Ltd., of Canada. Between 400 and 500 more people were employed at the Hollinwood and Stalybridge works of the company than at the time of the last dinner. Mr. Arthur Ellis proposed the toast of "The Ferranti Company," Mr. H. W. Kolle responding.

On January 29th about 400 of the staff of Associated Elec-

trical Industries, Ltd., were present at a carnival dance and cabaret at Victoria House, Southampton Row, a cabaret show being given by the Gordon-Marsh "Marshmallows." Sir Felix J. C. Pole, chairman of the A.E.I., presented the prizes, and among the directors and officials present were Messrs. W. C. Lusk, J. L. Wilson, John Gray, A. Clements, and J. N. Stephens of the B.T.-H.; Messrs. C. F. Spencer, C. H. Cox, F. W. Leevers, and T. S. Read, of the Ediswan Co.; and Messrs. P. S. Turner and A. S. Cachemaille of the Patent Dept., and Mr. G. Franklin of the Cosmos Lamp Works of Metropolitan-Vickers.

On the same evening the B.T.-H. Birmingham office staff held a dance. An entertaining interlude was provided by Miss F. M. Hughes, one of the younger members of the staff, who gave an exposition of operatic dancing. There were about 130 present.

The Manchester Magnet Amateur Dramatic Society of the G.E.C. is giving a performance of "The Unfair Sex" at the Lesser Free Trade Hall, Manchester, on February 26th.

South Africans at "English Electric" Works

The party of engineering students from the University of Witwatersrand, to whose tour reference was made in our last issue, visited the works of the English Electric Co., Ltd., Stafford. Upon their arrival they were received by the managing director, Mr. G. H. Nelson, and other members of the staff. Later in the day Mr. Nelson, in an address to the students, outlined the activities of the company and emphasised the vast possibilities that lay before Great Britain, South Africa, the Dominion and Colonies in co-operating to meet each other's needs; the designers and workpeople of this country inherited a long tradition of skill which could not be acquired by other countries in a short time.

A lantern address was given by Mr. H. S. Carnegie, of the Engineering Department, in which he outlined the chief features of the important contract now in hand for the equipment of the steel works of the South African Iron & Steel Industrial Corporation at Pretoria. Nearly 90,000 b.h.p. of motors with transformers, switchgear, and auxiliary apparatus on a corresponding scale are being constructed at Stafford Works for this customer alone.

Radio Factory Fire

A fire occurred at the factory of Messrs. E. K. Cole, Ltd., Southend, on February 5th. A statement issued by the company says that whilst the damage to the office furniture and equipment was substantial, all records, &c., were untouched, and practically the whole of the works and stores are in normal order, only a small portion of the Coil-winding Department being damaged by water. Normal working was expected to be resumed within ten days.

Municipal Trading at Leeds

A special meeting of the Leeds Corporation Electricity Committee was held recently, when proposals were considered regarding the showroom at the Headrow, and the assisted wiring scheme. According to the *Yorkshire Post*, it is felt that the continuance of the showroom is essential, and the practice will be revived of granting discounts in certain cases where the customer is introduced by an electrical contractor. It is proposed to discontinue the Corporation Wiring Department, except that the Corporation shall do the wiring necessary for cookers and wash-boilers. It is pointed out, however, that this will not involve the abolition of the assisted wiring scheme, and ratepayers will still be able to avail themselves of its advantages, the only difference being that in future all the wiring work will be done by the contractors, and not by the Department. Local members of the Electrical Contractors' Association have promised to co-operate with the Department.

A Large Neon Sign

One of the largest neon advertising signs yet erected in this country has recently been completed by Borough Electric Signs at Bow, London, E., for Messrs Bryant & May, Ltd. Its overall length is 165 ft., and approximately 1,200 ft. of glass tubing are used. Some indication of the size of the installation may be obtained by noting that the principal lettering seen in our illustration is 4ft. high. For these words double outline blue and red tubing is employed, the border around the lettering being green. In the pictorial panel in the centre the swan is carried out in blue tubing with a red beak; the ripples on the surface of the water are shown in green, while the reeds are in helium-filled tubes, giving an old-gold colour. The electricity required is taken from the Poplar Borough Council's mains, and the tubes are fed through a series of 29 transformers.

Water Heating at Birmingham

The accompanying illustration shows a special display of water heating apparatus given at the showrooms of the Birmingham Corporation Electricity Department in Paradise

The Birmingham water-heating display

Street, Birmingham, during the fortnight ended January 30th last. All the heaters were of Santon manufacture, and the window, which presented an attractive appearance, aroused a good deal of public interest.

Prices of Materials

Messrs. F. Smith & Co. report, February 10th: No change in the price of silicium bronze and electrolytic copper h.c. wire.

Messrs. Edward Till & Co. report, February 10th: India-rubber, Para fine, 3⅛d., ⅛d. dec.

Messrs. James & Shakespeare report, February 10th: Copper bars (best selected), sheet and rod, £72, £2 dec. English pig lead, no change.

The Timber Market

Our Timber Trade Correspondent reports that the demand for European woods has been very slow this year. The preference to the Empire overseas means that this country will not use so much European softwoods for building and joinery work, and that more Canadian will be imported for such purposes. The hardwood market has been very slow, but more inquiry has been made for home grown oak, ash and other British timbers. Makers of radio and gramophone cabinets would be well advised to consider Empire mahogany, spot stocks of which are not large, yet cheap, all things considered.

New Catalogues and Lists

Reliance Telephone Co., Ltd., 12-13, Henrietta Street, W.C.2.—A folder relating to the "Reliance" automatic intercommunicating telephones.

Gent & Co., Ltd., Faraday Works, Leicester.—Leaflet 222, dealing with synchronous "Electro-matic" clocks.

Brook Motors, Ltd., Empress Works, Huddersfield.—An abridged stock list (No. 323) of a.c. motors.

Marconiphone Co., Ltd., 210-212, Tottenham Court Road, W.1.—Two new leaflets showing the complete range of "Marconiphone" instruments, with details of hire-purchase terms.

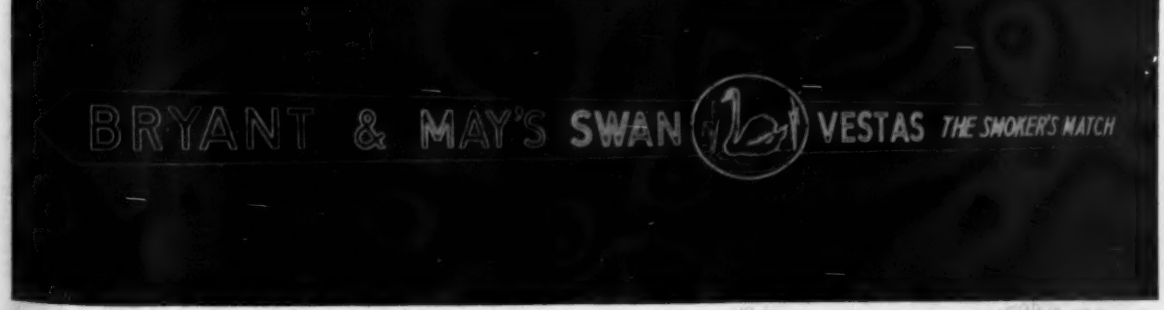
Sun Electrical Co., Ltd., 118-120, Charing Cross Road, W.C.2.—A leaflet dealing with a new range of "Sunco" irons, in red and blue enamel and nickel-plated finishes.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.—Illustrated leaflets giving full particulars of "Isco" insulated service cut-outs.

J. H. Tucker & Co., Ltd., King's Road, Tyseley, Birmingham.—A folder containing particulars of "Cooke's" improved hole cutter.

Ateliers de Constructions Electriques de Charleroi, 56, Victoria Street, S.W.1.—The February stock list of electric motors, transformers, circuit breakers, &c.

Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.—Folder 7053/0, covering a.c. and d.c. motors from 1/50 to ¾ h.p. Illustrated and priced.



A large neon sign recently erected for Messrs. Bryant & May, Ltd., at Bow, E.

Bankruptcy Proceedings

S. L. Holt, electrical and radio engineer, 46, Highland Terrace, Uffculme, Devonshire.—The first meeting of creditors was held on February 2nd, at the Official Receiver's offices, Exeter Bank Chambers, Broadgate, Exeter. The statement of affairs showed liabilities of £384 and assets of £74, leaving a deficiency of £310. The failure was attributed to ill-health, bad debts, and excessive interest on a loan. In March, 1931, the debtor could not give close attention to the business owing to ill-health and the position was attributed mainly to this cause. He became aware of his position in June last, but hoped his health would improve and allow him to attend regularly to the business. The case being a summary one was left in the hands of the Official Receiver as trustee.

J. E. Mather, plumber and electrician, 89, Gidlow Lane, Wigan, Lancs.—This debtor appeared for his public examination recently, at the Court House, Wigan, when the statement of affairs showed liabilities of £214 and assets of £47, leaving a deficiency of £167. The failure was attributed to lack of capital, trade depression, and the sickness and subsequent death of his wife. The debtor became aware of his position at the end of 1930, but continued to trade as he thought contract work would come in. The examination was closed.

W. G. G. Graham, electrician, "Tofts Lodge," Little Baddow, Essex.—The receiving order was made recently on the debtor's own petition. The statement of affairs filed shows liabilities of £417 and assets of £16, leaving a deficiency of £401. The debtor states that in September, 1930, he commenced business with a capital of £30, in partnership with another, at Chelmsford. The business was successful, and a net profit of £150 was earned to January 31st, 1931. At that time a private limited company was formed to take over the partnership business. In order to obtain business the debtor purchased second-hand motor cars which he used for his own travelling purposes, and which he had to maintain at his own expense. The total cost was about £230, of which £130 was still owing for repairs, &c. His salary of £200 as director and manager of the company was insufficient to meet household and personal expenses, and in May, 1931, he borrowed £60 which was guaranteed by two persons, with whom he deposited his shares in the company. In October, 1931, he resigned from the company and in November transferred his shares to one of the guarantors of the loan.

S. H. Holly, electrician and wireless dealer, 4, South Street, Wareham, Dorset.—This debtor appeared recently at the Law Courts, Bournemouth, for his public examination. A statement of affairs showed ranking liabilities of £252, with assets estimated to realise £151, and a deficiency of £101. The debtor said that he started business as an electrician and gas and water fitter in July, 1921, with a capital of £50. Recently he commenced to deal in wireless apparatus. Until 1928 his business was profitable, but from that time he experienced competition. The examination was adjourned.

C. G. Smith, electrical contractor, 66, Lichfield Street, Wolverhampton, Staffs.—The public examination was held on February 4th at the County Court, 50, Queen Street, Wolverhampton, when a statement of affairs was submitted which disclosed gross liabilities of £2,916, of which £2,034 was expected to rank for dividend. There was a deficiency of £1,875. The debtor attributed his failure to lack of capital and heavy overhead expenses. The examination was adjourned for closing.

E. Marsden, electrical engineer, 51, High Holme Road, Louth, Lincolnshire, formerly of Thongsbridge and New Mill, near Huddersfield.—The receiving order was made recently on the debtor's own petition. The first meeting of creditors was held at the Official Receiver's office, St. Mary's Chambers, Great Grimsby. According to the statement of affairs filed there were liabilities of £244 and assets of £57. The case being a summary one was left in the hands of the Official Receiver as trustee.

R. Hardman, electrical contractor, 30, Station Road, Swinton. —Receiving order made February 2nd on debtor's own petition.

C. N. Gale, wireless engineer, 7, Lumley Road, Leeds.—Receiving order made February 2nd on debtor's own petition.

C. W. Sands, electrical and wireless contractor, High Street, King's Langley, Hertford.—Trustee, Mr. J. L. Poland, 29, Russell Square, W.C. Official Receiver released January 14th.

I. Turner, wireless dealer, 103a, Little Ilford Lane, Manor Park, E.—Application for discharge to be heard on February 23rd at Bankruptcy Buildings, Carey Street. W.C.

C. G. Smith, electrical contractor, 66, Lichfield Street, Wolverhampton.—Trustee, Mr. A. E. Lacon, 14, Lichfield Street, Wolverhampton, appointed January 29th.

D. Makin, electrical engineer, 48, Dronfield Road, Pendleton, Salford.—First dividend of 4s. in the £, payable February 19th, at 4, Norfolk Street, Manchester.

A. W. Creasey (trading as the "Essex Electrical Storage Co."), engineer, Hall Lane, Walton-on-the-Naze, Essex.—The public examination was closed recently at the Law Courts, Town Hall, Colchester.

Company Liquidations

Quickfix Electrical Fittings Co. (1928), Ltd.—A meeting of creditors was held at the Religious Institution Rooms, 200, Buchanan Street, Glasgow, on February 3rd. Mr. W. J. McLaughlin (liquidator) presented a statement of affairs showing liabilities of £29,527 and assets of £9,359. At the suggestion of a cash creditor (for £24,500) it was decided as Mr. McLaughlin had had a previous association with the company to appoint him joint liquidator with Mr. Alexander Pyper, 87, St. Vincent Street, Glasgow, the nominee of the creditors. A committee of inspection was also appointed.

Hendon Electric Lamp Co., Ltd.—Meeting, March 4th, at the offices of F. Rowland & Co., 76, Finsbury Pavement, E.C., to receive an account of the winding-up by the liquidator, Mr. F. Rowland.

Northern Electric Wire Co., Ltd.—Meeting March 11th at the offices of Connollys (Blackley), Ltd., Blackley, Manchester, to receive an account of the winding up by the liquidator.

South Wales Power Co., Ltd.—Meeting March 16th at the Park Hotel, Cardiff, to receive an account of the winding-up by the liquidator, Mr. D. H. Allan.

Electricity Supply

Lighting, Domestic, Power

Accrington.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £1,210 to supply additional energy to Messrs. C. and W. Walmsley, Three Brooks Mill, Oswaldtwistle.

Aldershot.—LOAN SANCTIONED.—The Town Council has received sanction to a loan of £12,632 for mains, services, and meters.

Birmingham.—ELECTRICAL DEVELOPMENTS.—Ald. Sir Percival Bower (chairman of the Electricity Supply Committee), speaking at the meeting of the City Council last week, stated that of £719,000, which was asked for in connection with the capital requirements of the Department, £500,000 was for general mains extensions. During the past financial year 229½ miles of mains were laid, bringing the total mileage at March 31st last to 1,886 miles. Up to the present the frequency in sixty-four of the larger factories had been changed over, and the number of motors changed totalled 2,250, representing 33,500 h.p. A very large change-over programme was proposed for the present year. The Department had installed additional generating plant for the new frequency totalling 55,000 kW at Nechells and Hams Hall, while the three largest generators were now being rewound for the new frequency. The grid lines of the Central Electricity Board between Hams Hall and Nechells and between Hams Hall and Bartley Green were now in regular service. Birmingham was not yet definitely linked up with the other undertakings in the Central England area, although the whole of the grid lines were practically completed.

Blackburn.—INSTALLATION OF PLANT.—The Electricity Committee has approved the expenditure of £942 on the installation of switchgear and a transformer at the works of British Northrop Loom Co., which is taking a special supply from the Corporation mains.

Burnley.—SCHOOL INSTALLATIONS.—The Education Committee is to install electric lighting at Abel Street and Rosegrove schools at a cost of £1,050. An electric heating installation is also to be carried out at Rosehill Infants' School at a cost of £520.

Canada.—HYDRO-ELECTRIC OPPORTUNITIES IN BRITISH COLUMBIA.—The Chief Commissioner of the Greater Vancouver Water District has submitted to the City Council a comprehensive report on the potential hydro-electric power developments in the Cheakamus River region where the city holds a water power reserve. The report indicates that a maximum of 220,000 h.p. could be developed at five different sites, the approximate cost being estimated at $23,959,870. Including transmission lines and sub-stations, the total cost would reach $28,489,870. The five sites dealt with, in the probable sequence of construction, are: Garibaldi Lake, where development of 50,000 h.p. is contemplated; Cheakamus Lake-McGuire (48,000 h.p.); McGuire-Brandywine (60,000 h.p.); Cheakamus Canyon (50,000 h.p.); and Daisy Lake (12,000 h.p.).

Chichester.—EXTENSIONS.—Application has been made by the City Council for sanction to a loan of £10,000 for the extension of mains and services.

Clacton-on-Sea.—STREET LIGHTING.—Central street lighting is to be installed in Pier Avenue and Station Road at a cost of £713.

East Grinstead.—OFFER TO PURCHASE UNDERTAKING.—The Weald Electricity Supply Co., Ltd., has made an offer to purchase the Urban District Council's electricity undertaking.

Edinburgh.—FLOODLIGHTING OF CASTLE.—The Corporation has approved a recommendation by the Public Utilities Committee that the wiring of the castle for a permanent installation of floodlighting should be proceeded with at a cost of £2,350.

Glasgow.—MAINS EXTENSIONS.—The Electricity Committee recommends mains extensions costing £2,887.

ELECTRICITY IN SLAUGHTER HOUSES.—The report of the general manager of the Electricity Department regarding electrical installations in slaughter houses and markets is being considered by the Markets Committee.

Heston and Isleworth.—MAINS EXTENSIONS.—Mains extensions are to be carried out to the Heston Senior School and along the Great West Road and Bath Road at a total cost of £2,539.

Isle of Man.—THE ELECTRICITY BILL.—The Bill which provides for the setting up of an electricity board and the distribution of electricity in the Isle of Man is having a stormy passage in the Manx Legislative Council. Objection has been taken to the financial provisions, which are that all loans borrowed by the board shall be guaranteed by the Government, and that the latter shall pay half the interest on borrowed capital for the first 15 years of the scheme. The Bill was introduced in substitution for one which granted a monopoly to a private company, and in the Council it has been suggested that the island's chance was lost when it let the company go. The Bill is to be further debated on the motion to read it a second time.

Keighley.—REQUEST FOR ELECTRICITY.—At the request of Council tenants in Broomhill Grove and Ashborne Road, the Housing Committee has agreed to obtain tenders for wiring the houses for electricity.

Lanark.—ELECTRICITY PREFERRED.—The County Council is to install electricity in place of gas at the houses on the Millerston Estate.

Lerwick (Shetland).—CONTRACTS PLACED FOR ELECTRICAL PLANT.—The Town Council has authorised the acceptance of tenders totalling £11,298 for the town's new electrical plant. Messrs. James Kilpatrick and Son, Ltd., are the principal contractors, the cost of their part of the work being £5,633. The engineer has been instructed to report on the question of an all-in rate for private houses. The work of preparing the foundation for the power house was begun about five weeks ago.

Liverpool.—CLARENCE DOCK STATION.—The Clarence Dock Power Station Sub-Committee is making application for sanction to the borrowing of £42,964 for works in connection with the construction of the Clarence Dock power station. Mr. Pybus, the Minister of Transport, is to be asked to open the first section of the station which has now been almost completed.

SUB-STATION EQUIPMENT.—Sanction has been received for a loan of £100,000 for sub-station equipment.

ELECTRICITY DEPARTMENT'S GOOD PROSPECTS.—The Electric Power and Lighting Committee estimates its surplus on the current year to be £105,000, of which £30,000 is to be devoted to the relief of the rates. The surplus is £39,000 more than was anticipated.

London.—BERMONDSEY.—The Electricity Committee has instructed the engineer to obtain tenders for rectifying plant, switchgear, transformers, mains extensions, &c., estimated to cost £9,000.

Lothians.—EXTENSIONS TO PATHHEAD.—The Lothians Electric Power Co. has completed the extension of its supply system from Fordel to Pathhead.

Manchester.—PROGRESS DURING DECEMBER.—During December the Corporation Electricity Department increased its connections by 5,554 kW, bringing the total to 471,087 kW. New consumers (including additional supplies) numbered 1,666, representing a total of 3,266 kW. There were 220 new cookers let out on hire, making a total of 8,885 now on circuit; applications for the hire of cookers amounted to 147. Five sub-stations were put into commission, and new plant was installed at the Kearsley Mill sub-station. The output on feeders for December (48,594,230 kWh) was the highest ever recorded in any one month. The previous highest was 45,909,580 kWh in January, 1931.

Milton Regis.—SUPPLY TO UPCHURCH AND LOWER HALSTOW.—The Kent Electric Power Co. has informed the Rural District Council of its intention to erect overhead lines to supply electricity to Upchurch and Lower Halstow.

Newark.—TARIFF REVISIONS.—The following revision in the scale of charges for electricity is recommended by the Electricity Committee:—Lighting: 5½d. per kWh for first 250 kWh per quarter, and 5d. per kWh for all energy in excess of 250 kWh per quarter. Lighting through prepayment meters: 6d. per kWh. Heating: 1½d. per kWh. Power: 2d. per kWh for first 1,000 kWh per quarter; 1½d. for second 1,000 kWh; 1¼d. for third 1,000 kWh; and 1¼d. above. Domestic and contract rate: Existing fixed charge plus 1d. for first 250 kWh per quarter; ¾d. per kWh for all above 250 kWh per quarter. Minimum charge: To be reduced to 10s. for winter quarters and 7s. 6d. for summer quarters. Reductions are also proposed in the charges for supplies under special agreement, and certain alterations are to be made to the assisted wiring scheme.

Norfolk.—ELECTRICAL DEVELOPMENT.—The East Anglian Electricity Supply Co., Ltd., is shortly to afford a l.p. supply to the parishes of Narborough, West Winch, Wiggenhall St. Mary, Fakenham, Earsham, Castleacre, Setchey, Winbotsham, Litcham, Snorle-with-Palgrave, Great Dunham, Tittleshall, Gayton, Watlington, Downham Market, Hempton, Whissonsett, and Colkirk. The company has introduced a two-part tariff for occupiers of small rural property with an annual charge of £3 per annum (or more, depending on the floor area) for which 120 kWh is supplied, the excess "unit" charge being 1½d. The service, three lighting points, and one plug are supplied free by the company.

Oxford.—EXTENSIONS.—The Electricity Committee is to apply for sanction to a loan of £15,000 for mains and works extensions.

CHANGE-OVER.—Change-over works and extensions to mains in Osney Lane are to be carried out at a cost of £1,307.

NO PYLONS ON HINKSEY HILL.—As a result of an inquiry held last month, the Minister of Transport has refused to give his permission to the erection of pylons over Hinksey Hill.

Portland.—PROPOSED EXTENSIONS.—The Electricity Committee is considering the extension of the supply to Southwell and Weston.

LOANS SANCTIONED.—Sanction has been received to loans of £7,000 for mains and services, £2,580 for plant, £540 for meters, £500 for assisted wiring, and £500 for domestic apparatus.

Portsmouth.—LOAN.—The Electricity Committee is applying for sanction to a loan of £76,475 for mains and sub-station equipment.

Portuguese East Africa.—PROPOSED NEW POWER STATION.—Mr. A. L. Ohlson, manager in South Africa for the Metropolitan-Vickers Electrical Export Co., Ltd., Johannesburg, has informed the Lourenço Marques Municipality that a London financial group connected with his company is negotiating with the object of acquiring the water and light concessions from the Delagoa Bay Development Corporation. He states that if the Lourenço Marques Council will extend the concession another thirty-five years the new company will construct a new power station costing at least £100,000.

St. Helen's.—SUPPLY TO HOUSING ESTATE.—The Housing Committee has agreed to have houses on the Windlehurst housing estate wired for electric lighting.

Seaham Harbour.—LOANS.—The Electricity Committee is to apply for sanction to loans of £1,000 for meters, £2,000 for services, £250 for land and buildings, and £210 for mains.

Southport.—ILLUMINATION SCHEME.—The Town Council has adopted a scheme for the illumination of the stage of the Floral Hall at an estimated cost of £1,150.

Stockport.—COOLING TOWER.—The Town Council, which recently applied for sanction to a loan of £35,808 for a cooling tower and accessories, has decided, at the suggestion of the Electricity Commissioners, to erect a wooden tower, thereby saving about £5,400.

An interlocking frame, part of a system of electric signals, being installed in a London signal box

Stockton-on-Tees.—REDUCED CHARGES.—The Electricity Committee has reduced the hire charge for wash boilers from 3s. 6d. to 2s. 6d. per quarter, and has agreed to give a discount of 2½ per cent. on cash paid through slot meters.

Stretford.—COOKING AT NEW TOWN HALL.—The Urban District Council is to obtain estimates for cooking by gas and by electricity at the new town hall.

STREET LIGHTING.—Estimates are also to be obtained by the Highways Committee of the cost of street lighting by gas and of the lighting efficiency for the purposes of comparison with electricity.

Uttoxeter.—LOAN.—The Urban District Council has received sanction to a loan of £5,000 for electricity purposes.

Watford.—MAINS AND SERVICES.—The Town Council has applied for sanction to a loan of £50,000 for mains and services. An unemployment grant for mains has been refused, and the Electric Light and Power Committee is to consider how far it can proceed with the work.

BULK SUPPLY OFFER REJECTED.—The Council has decided to reject the offer of the Central Electricity Board for a supply in bulk. The application for sanction to a loan of £60,000 for extending the generating plant is to stand.

West Ham.—LOAN.—The Town Council has applied for sanction to a loan of £10,568 for two cooling towers, foundations and steelwork, piping, valves, etc.

Woolwich.—SUPPLY TO COUNCIL HOUSES.—With reference to a proposal by the Corporation to extend the mains to supply Council houses, the Electricity Committee states that the total cost, including services and sub-station, will be approximately £20,000. The Council has agreed to guarantee 20 per cent. of the cost of supplying the first 400 houses.

Worcester.—LOAN.—The Electricity Committee is asking the City Council for sanction to borrow approximately £32,000. The Committee consider the expenditure necessary to keep the operating system of the Worcester plant in parallel with that of the Shropshire, Worcestershire and Staffordshire Electric Power Co.'s link line.

Traction

East Ham.—VEHICLES FOR REFUSE COLLECTION.—The Cleansing Committee recommends the purchase of two electric vehicles for refuse collection at an estimated cost of £1,600.

Gloucestershire.—AUTOMATIC TRAFFIC CONTROL.—The County Highways Committee has decided to have automatic traffic signals installed at Cirencester, Stroud, Kingswood, and Staple Hill, at an estimated cost of £838.

Hull.—TRAMWAY ABANDONMENT.—'Buses are to be substituted for trams on the Cottingham Road, Beverley Road, Spring Bank, and Spring Bank West routes.

Liverpool.—TRANSPORT COMMITTEE APPOINTED.—A committee has been appointed by the City Council to consider the transport services in the city, particularly with reference to the Corporation's tram and bus undertaking. In 1928 the tramway undertaking had reserves amounting to £350,000, but now there is only £17,000 in hand. The net surplus in 1928 was £250,000, and estimates for the current year reveal that only a £26,000 surplus is expected.

London.—GREATER TUBE COMFORT.—New luxury coaches in three colours are to be put into operation on the District Railway on the Acton Town-Hounslow and Acton Town-South Harrow routes. They are to have twelve doors instead of eight.

MORE TRAFFIC SIGNALS.—The extension of the automatic traffic control system to Piccadilly, Trafalgar Square, Edgware Road, Wigmore Street, and other busy thoroughfares is under consideration.

Newcastle-upon-Tyne.—APPEAL AGAINST PROTECTION OF TRAMS.—An inquiry was held recently by the Ministry of Transport into an appeal by the Gosforth Urban District Council against the decision of the Traffic Commissioners in granting a protective fare to the Newcastle Corporation's tramway undertaking against the buses which operate on the route.

Newport (Mon).—THE STOW HILL ROUTE.—The Town Council is considering the substitution of trolley or petrol buses for trams on the Stow Hill route.

Norwich.—THE FUTURE OF THE TRAMWAYS.—The City Council has been discussing with the Norwich Electric Tramways Co. the question of the future of the tramway undertaking. The Corporation has an option to take over the tramways this year. It is understood that the tramway company has received an offer from the Eastern Counties Omnibus Co. to purchase the undertaking.

South Africa.—NATAL RAILWAY ELECTRIFICATION.—The electrification of the railway from Cato Ridge to Pietermaritzburg, 51 miles on the Natal main line, has just been completed. From Pietermaritzburg to Glencoe Junction, 174 miles, electrification was completed in 1926, so that there is now through running between Glencoe and Cato Ridge, a distance of 225 miles. Electrification of the new section cost £175,000, and it is expected to save £40,000 per annum in operating expenses.

Communications

Denmark.—TELEPHONE CABLE.—Hitherto telephone communication between the Danish island of Bornholm and the mainland has been maintained by a radio circuit. As this has been subject to frequent interruption, a telephone cable has recently been laid to the island.

East Africa.—LONG-DISTANCE TELEPHONY.—After 15 months' work Nairobi has been linked up by telephone with Mombasa, a distance of 320 miles. The new line was formally inaugurated on February 2nd across miles of practically uninhabited game-country. Nairobi is already linked with various up-country centres, while Mombasa is connected with other coastal towns, so that it is now possible, for instance, to talk across the 664 miles from Njoro to Dar-es-Salam. As a result of past experience the telephone overhead-line standards have been made very much higher than was previously the case, to avoid the possibility of the wires being carried away by giraffes. —*Reuter* (Nairobi).

Great Britain.—TELEGRAPHS AND TELEPHONES.—A Government White Paper shows that during 1930-31 the deficit on the telegraph service reached £1,005,669, compared with £800,312 in the preceding year. The telephone service made a surplus of £343,219, a decrease of £169,995. Telegraph income decreased by 10.38 per cent., while telephone revenue increased by 4.35 per cent. Telegraph expenditure fell by 5.37 per cent. and that on the telephone service rose by 5.25 per cent. The decrease in telegraph operating income for 1930 was not entirely due to the decline in telegraph business; the accounts for 1929 included a contribution of £171,944 in respect of beam wireless and Imperial cables, which were operated by the Post Office up to September, 1929, as an agency service. Cash received from wireless licences was £1,812,171. Deducting 12½ per cent. for management (£226,521) and the contribution to cost of conversion of " spark " wireless station (£4,594) there was left a total of £1,581,056. The payment to the B.B.C. was £1,069,648, the balance of £511,408 being retained by the Exchequer.

Irish Free State.—NEW RADIO PLANT.—Marconi's Wireless Telegraph Co., Ltd., has lately ordered from the Brown, Boveri Co. for the new Athlone high-power broadcast transmitting station high-voltage d.c. plant consisting of two 230-kW 12,000-V rectifiers and a rectifier transformer for regulating the d.c. voltage between 6,000 and 12,000 V.

Liverpool.—TELEPHONE PROGRESS.—The local P.T. & T. Advisory Committee's annual report shows that in the South Lancashire district (superintending engineer: Mr. T. E. Herbert) during the year ended September 30th, 1931, the net increase in the number of new telephones fitted, after allowing for cessations, was 1,699, or 2.26 per cent. on the total of 76,697, which is not so satisfactory as in the previous year. There was an abnormal number of cessations consequent upon the prolonged trade depression. During the year the local cables have been extended to meet anticipated requirements and further extensions are contemplated. The new main cables from Liverpool to Birmingham and London, and from Liverpool to Colwyn Bay, were brought into use. The erection of the national power grid has necessitated careful planning of telephone lines and somewhat extensive alterations to safeguard the P.O. plant from contact with the power lines and from the effects of electrical induction. The Liverpool-Warrington power line crosses the P.O. overhead routes in 26 places. The Liverpool-Southport power line has necessitated the recovery of an overhead section of one of the P.O. main routes to the north, the diversion of the circuits to an underground cable, and the installation of repeater equipment at Liverpool and Ormskirk to compensate for the loss in transmission efficiency due to the diversion to underground cable. Further extensions of the repeater equipment have been carried out and cord circuit repeaters have been introduced. These enable assistance to be given on selected calls where the number of links or the distance justifies this course.

Mr. T. E. Herbert, superintending engineer of P.O. Telephones in the South Lancashire district

London.—TELEPHONY.—The annual statement of progress in the London area (controller: Mr. W. H. U. Napier; superintending engineer: Mr. E. Gomersall) indicates the most noteworthy feature of 1931 to have been the introduction of " on demand " service for long-distance calls. Between 80 and 90 per cent. of the calls to Birmingham are now completed while the caller remains at his telephone. Arrangements are in hand for the extension of this service to other towns, including Manchester, Liverpool, Glasgow, Leeds and Bristol. The switching equipment used for this service is of a new type and has many special features designed to accelerate the service and improve the quality of speech.

It has been announced that the London telephone area is to be extended early in 1932 to cover approximately 1,200 sq. miles; 67 provincial exchanges serving about 25,000 subscribers' lines will thus be brought into the London area. In June, 1931, the 2,000,000th telephone to be installed in this country was accepted by the King for use in Buckingham Palace. There are now 154 telephone exchanges in London, viz., 36 automatic, 114 manual, two toll, and the trunk and tandem exchanges. The number of direct exchange lines on December 31st, 1931, was 426,000, the increase for the year being 16,800. Approximately 28 per cent. of these lines are connected to automatic exchanges. The number of telephones in the area increased by 27,500 to 731,000 at the end of 1931.

The total number of calls originated in the area during the year was 681 millions, an increase of about two per cent. The growth in the number of private branch exchanges has continued, the total number in London now being 30,887, of which 138 are automatic.

Reference is made to the introduction of a device for enabling operators at manual exchanges to reach subscribers connected to automatic exchanges without the aid of operators at the latter exchanges. The required number is keyed direct from the manual exchange and transmitted by various combinations of currents of four different frequencies, which operate tuned relays at the automatic exchange to obtain the required line. The installation of the necessary additional apparatus at 64 manual exchanges is nearing completion. It has been found possible to operate a number of trunk circuits without any loss by attenuation of speech between London and Glasgow, Aberdeen, Edinburgh and Newcastle; the method is to be extended to the main trunk lines as quickly as possible.

The number of originated overseas calls handled in the London trunk exchange during the year was 584,000. The number of call offices was 7,500; the total calls reached 681 millions, an increase of 13 millions; the number of phonograms was 3,600,000, and the single-wire mileage was 3,225,599. The proportion of telephones to population was one to 11.3.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Aberdeen.—February 16th. Dispensary and Vaccine Institution Committee. Electric lighting, &c., at the buildings, Barnett's Close. Specifications, &c., from J. B. Nicol, architect, 367, Union Street.

Argentina.—BUENOS AIRES.—February 25th. Electric pumping sets with switchboard, &c., for La Plata. (G.X. 11126.)*

Australia.—BARRON FALLS HYDRO-ELECTRIC BOARD.—March 28th. Hydro-electric station 20 miles from Cairns. (A.X. 11267.)*

Bedford.—February 26th. Electricity Department. E.h.p., h.p. and l.p. underground cables and lamps. (See this issue.)

Belgium.—BRUSSELS.—February 24th. Régie des Télégraphes et Téléphones, Salle de la Madeleine, Brussels. Supply and laying of telephone cables in the Bruges, Alost and Ghent districts. Particulars (Cahier des Charges Spécial No. 3-610) for 6.80 fr.

Benfleet (Essex).—February 22nd. Urban District Council. Sewerage pumping plant, with electric motors and accessories. Particulars from Mr. W. E. Blizard, engineer, 25, Victoria Street, S.W.1.

Carlisle.—February 23rd.—Installation of lighting and heating at Longtown Isolation Hospital. Particulars from the city electrical engineer.

Dumfries.—February 13th. County Council. Electric wiring in 16 schools, teachers' houses, &c. Specifications from Mr. J. R. Hill, clerk of works, County Buildings, Dumfries.

Dumfriesshire.—February 27th. County Council. Electrical distribution scheme. (See this issue.)

Edinburgh.—March 10th. City Council. General electrical stores. (See this issue.)

Hamilton.—Electricity Department. 1,000-kW rotary convertor. (February 5th.)

Harrogate.—February 17th. Twelve months' supplies of electric lamps. Particulars from Mr. C. E. Rivers, Municipal Offices.

February 27th. Electricity Department. General stores. (See this issue.)

Hull.—March 14th. Electricity Department. Time switches. (See this issue.)

Ilford.—March 10th. Ilford and Barking Joint Sewerage Committee. Standby generating plant. Particulars (deposit £2 2s.) from Messrs. W. H. Radford & Son, Albion Chambers, King Street, Nottingham.

India.—February 23rd. Bengal and North-Western Railway Co., Ltd. 27,400 electric lamps. (February 5th.)

Kettering.—February 22nd. Electricity Department. E.h.p. and l.p. underground cables. (February 5th.)

Knaresborough.—February 22nd. West Riding County Council. Electric lighting installation at King James Grammar School. Specifications from the education officer, County Hall, Wakefield.

Leeds.—February 16th. Education Committee. Electrical work required in buildings during year ending March 31st, 1933. Particulars from the Architects' Section, Education Dept., Calverley Street.

Tramways Committee. Electrical sundries for year ending March 31st, 1933. Specification (Sch. No. 5) from the Tramways Dept., Swinegate.

February 16th. Electricity Department. General stores. (January 29th.)

Lithuania.—KOVNO.—February 24th. Administration of Posts, Telegraphs and Telephones. Bronze wire, galvanised iron wire, steel wire cable, telephone cable, submarine cable, cross arms, lead distribution sleeves, coupling sleeves, copper and aluminium sleeves. (A.11253.)*

Llandrindod Wells.—February 22nd. Urban District Council. Electrically driven pumping plant. Specifications, &c., from Messrs. Fiddian & Deeley, 13, Church Street, Stourbridge (deposit £2 2s.).

Loanhead (MIDLOTHIAN).—February 22nd. Corporation. Electric lighting installation at 56 houses. Schedules, &c., from Mr. G. B. Deas, architect, Central Chambers, High Street, Kirkcaldy.

London.—CENTRAL ELECTRICITY BOARD.—February 29th. 33-kV overhead transmission lines for South Scotland Electricity Scheme. (January 29th.)

FULHAM.—March 7th. Borough Council. Generating station extensions. (January 29th.)

HAMMERSMITH.—February 24th. Borough Council. General stores, including electrical requisites. (January 29th.)

STOKE NEWINGTON.—February 24th. Electricity Department. Meters and cables. (See this issue.)

Long Eaton.—February 24th. Electricity Department. Cables, meters, cut-outs, and coal. (See this issue.)

Longtown (CUMBERLAND).—February 23rd. Joint Hospital Board. Installation of electric lighting and heating at the Isolation Hospital. Particulars from the city electrical engineer, Carlisle.

Manchester.—February 24th. Electricity Committee. Boiler and boiler-house vacuum cleaning plant. (February 5th.)

Milford Haven.—February 29th. Electricity Department. Electrical goods and materials, including meters. (See this issue.)

Montrose.—February 20th. Directors of the Royal Asylum. Electrical and heating work at new nurses' home. Particulars from Mr. J. A. Ogg Allan, architect, 25, Union Terrace, Aberdeen (deposit £2 2s.).

New Zealand.—WELLINGTON.—March 30th. Adhesive insulating tape. (A.X. 11257.)*

Oldham.—March 3rd. Public Assistance Committee. Electric lamps and fittings. Particulars from the Public Assistance Officer, Town Hall.

Perth.—February 29th. Electricity Department. Feeder and pilot cables. (See this issue.)

Plymouth.—March 7th. Belt conveyor. (See this issue.)

Rothwell (West Riding).—February 22nd. County Council. Electric lighting installation at new Grammar School. Specifications from the education officer, County Hall, Wakefield.

Salford.—February 15th. Transport Department. Twelve months' supply of stores. Forms of tender from the general manager, Frederick Road.

March 5th. Electricity Department. General stores. (See this issue.)

Sleaford.—March 1st. Urban District Council. Metal-clad switchgear. (See this issue.)

South Africa.—DURBAN.—March 18th. Corporation. Tramway rails, &c. Specifications from Webster Steel & Co., 9, St. Helen's Place, E.C.3.

Swansea.—February 17th. Electricity Department. General stores. (January 29th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Blackpool.—Electricity Committee. Accepted. Switchgear for change-over.—Switchgear & Cowans, Ltd. Five 100-kW transformers.—General Electric Co., Ltd. Seven 150-kW and three 300-kW transformers.—British Electric Transformer Co., Ltd.

Burnley.—Improvements Committee. Accepted. Traffic signals (£111).—Revo Electric Co., Ltd.

Chesterfield.—Electricity Committee. Accepted. Cable (£228). —Derby Cables, Ltd.

East Ham.—Electricity Committee. Recommended. Cable. —Enfield Cable Works, Ltd.

Glasgow.—Transport Committee. Accepted. Electric lighting at Knightsbridge garage.—Siemens Electric Lamps & Supplies, Ltd.

Health Committee. Recommended. Three electrically driven pumps at Gartlock Hospital (£278).—Rees Roturbo Co., Ltd.

Housing Committee. Recommended. Electrical installation at Hawthorn pavilions (£109).—A. A. Lightbody.

Corporation. Accepted. Electrical installation at Hawthorn Street bowling and tennis pavilion (£109).—A. A. Lightbody.

Health Committee. Recommended. Installation of electric cooking apparatus at Gartloch Mental Hospital (£511).—Archibald Low & Sons, Ltd.

Kidderminster.—Worcestershire C.C. Accepted. Electric lighting at Poor Law Institution (£1,465).—Abell & Smith.

London.—L.C.C. Education Committee. Accepted. Electric lighting installations at schools.—Wilmot Street (Bethnal Green).—C. R. Price. Back alley site (Bow and Bromley).—J. G. Sneath, Ltd. Blundell Street (Islington).—Buchanan & Curwen.

Highways Committee. Accepted. Two D.K. 126 A motors and three spare armatures.—English Electric Co., Ltd. 8,000 single insulator clips and 7,000 double insulator clips.—R. A. Bradshaw & Son, Ltd. 13,000 copper bonds.—British Insulated Cables, Ltd. 15,000 porcelains for track insulator standards.—Electric & Ordnance Accessories Co., Ltd.

Housing Committee. Accepted. Installation of wiring and fittings for electric lighting.—Downham Clinic (£172), and on the staircases, &c., in houses on Comber estate (£104).—Electrical Installations, Ltd. Dwellings on Loughborough estate (£872).—Hall & Stinson, Ltd. Boundary Street estate (£686).—J. Holbrook & Tattersall, Ltd.

Manchester.—Electricity Committee. Accepted. Lamp shades for six months.—Hailwood & Ackroyd, Ltd.; Lighting Research, Ltd.; R. Johnson, Clapham & Morris, Ltd.

Newcastle-on-Tyne.—City Council. Accepted. Installation of radio apparatus at the Barrasford Sanatorium (£210).—Mornington Barber. Installation of Holmes-Reyrolle automatic traffic signals at various points in the city (£324).—Holmes-Reyrolle & Co.

Oxford.—Electricity Committee. Accepted. Lamps in connection with the change-over (£15,000).—General Electric Co., Ltd.

Portsmouth.—Assistance Committee. Accepted. Electrical fittings for institution laundry (£82).—H. A. Evans, Ltd.

Electricity Committee. Accepted. Switchgear (£1,935).—English Electric Co., Ltd. Twelve 50 kVA transformers.—Metropolitan-Vickers Electrical Co., Ltd. Cable.—Johnson & Phillips, Ltd. (£155); Ediswan Cables, Ltd. (£392); Hackbridge Cable Co. (£257); Mersey Cables, Ltd. (£45).

Surrey.—Public Assistance Committee. Accepted. Internal wiring and electrical fittings at the Dorking Institution (£185). —Chapman, Lowry & Puttick.

Torquay.—Education Committee. Recommended. Electrical installation, Barton Infants' School (£142).—S. Truscott.

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of the makers of the following:—

ELECTRONUS electric tubular lamps.

Agents for SUPERIOR ELECTRICS, LTD., Pembroke, Canada.

FLEXUM glass letters.

Forthcoming Events

British Industries Fair.—Castle Bromwich (Birmingham Section), February 22nd-March 4th. Olympia, February 22nd-March 3rd. White City (Textile Section). February 22nd-March 5th.

Association of Mining Electrical Engineers.—Saturday, February 13th. South Wales Institute of Engineers, Cardiff. 6 p.m. "Frequency Change-over with special reference to Industrial Problems." Mr. T. H. Windibank.

Association of Supervising Electrical Engineers.—Tuesday, February 16th. Junior Institution of Engineers, London. 7.15 p.m. "Applications of Electricity to Farming and Horticulture." Mr. F. E. Rowland.

Overhead Lines Association.—Wednesday, February 17th. Institution of Electrical Engineers, London. 5.30 p.m. Discussion on "Standardised Designs for Overhead Lines." Opened by Mr. A. Lennox Stanton.

Electrical Wholesalers' Federation.—Thursday, February 18th. Savoy Hotel, London. 6.30 for 7 p.m. Annual dinner.

Institution of Electrical Engineers.—Thursday, February 18th. Institution, London. 6 p.m. "Commercial Cooking by Electricity." Dr. T. Settle. Monday, February 15th. Institution, London. 7 p.m. Informal meeting. Discussion on "Electro-Medical Appliances in General." Opened by Mr. G. G. Blake. (*London Students' Section*).—Saturday, February 13th. 3 p.m. Visit to the Ford Works, Dagenham. (*Mersey and North Wales (Liverpool) Centre*).—Monday, February 15th. Arts Theatre, The University, Liverpool. 7.30 p.m. Faraday lecture. "Everyday Uses of Electricity." Prof. J. K. Catterson-Smith. (*North-Western Students' Section*).—Tuesday, February 16th. Engineers' Club, Manchester. 7.15 p.m. Joint meeting with I.M.E. Graduates. "Mechanical and Electrical Control of Ward-Leonard Winders." Mr. E. Loynes. (*Sheffield Sub-Centre*).—Wednesday, February 17th. Royal Victoria Hotel, Sheffield. 7.30 p.m. Address by Capt. J. M. Donaldson, followed by a smoking concert. (*Tees-side Sub-Centre*).—Wednesday, February 17th. Cleveland Technical Institute, Middlesbrough. 7 p.m. "Metal-Clad Switchgear, Automatic Protection, and Remote Control, with special reference to developments during the last seven years." Mr. H. W. Clothier. (*Irish Centre*).—Thursday, February 18th. Trinity College, Dublin. 7.45 p.m. "The Technique of Lamp Manufacture." Mr. B. P. Dudding.

Electrical Association for Women.—Thursday, February 18th. E.L.M.A. Lighting Service Bureau, London. 3 p.m. "Various Forms of Electric Heating." Mr. R. Grierson.

British Electrical Development Association.—Friday, February 19th. Caxton Hall, Westminster, S.W. 7.30 p.m. "The Essential Principles of Salesmanship." Mr. W. Attwood.

Illuminating Engineering Society.—Friday, February 19th. Royal Society of Arts, London. 7.15 p.m. Discussion on "The Lighting of Churches and Cathedrals."

Junior Institution of Engineers.—Friday, February 19th. Institution, London. 7.30 p.m. "The Ventilation and Cooling of Turbo-Alternators." Mr. D. MacFarlane.

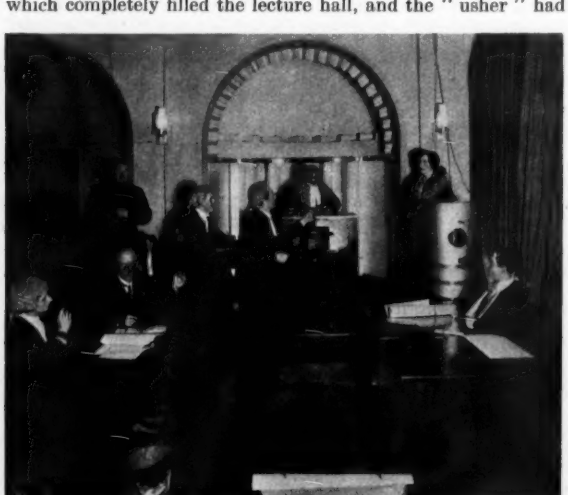
Manchester Electro-Harmonic Society.—Friday, February 19th. Waldorf Hotel, Manchester. 7 p.m. Smoking concert.

Batti-Wallahs' Society.—Friday, February 19th Hotel Metropole, London. 12.30 for 12.55 p.m. Luncheon. "Public Economy." Sir Ernest J. P. Benn.

Notes

"Lumens at Law"

A very creditable performance of the now well-known mock trial entitled "Lumens at Law" was given by the E.A.W. at the London Lighting Service Bureau on Monday last. The eighteen members of the cast and the twelve jurymen under the direction of Miss V. Norvick, as producer, amused an audience which completely filled the lecture hall, and the "usher" had



"Lumens at Law."

frequently to demand "silence in court." If we award premier honours to anyone it must be to Mr. W. J. Jones, who very sportingly undertook at two hours' notice to interpret the difficult part of John Nodole, the plaintiff, owing to the actor who had rehearsed the part having gone down with influenza. At the end of the performance Lady Moir (president, E.A.W.) was able to announce that the funds of the E.T.B.I. had benefited from the tickets and programmes sold to the extent of ten guineas.

I.E.E. Summer Meeting

The Council of the Institution of Electrical Engineers has accepted an invitation from its North Midland Centre for the summer meeting to be held in Yorkshire (Harrogate, Leeds, and Sheffield) from May 31st to June 3rd, 1932. A preliminary circular regarding the meeting will be issued to members shortly.

Faraday House Old Students' Association

The annual supper-dance of this Association and Faraday House Rugby Club was held on February 5th at the Hotel Russell, Russell Square, W.C. This function is as popular as ever, and many who have attended in previous years were again present. The informal nature of these functions is one of their most pleasing features, and the 150 members and friends present entered into the spirit of the evening with zest. The polka and other Victorian dances which were again introduced by way of diversion proved extremely popular. The duties of M.C. were in the capable hands of Mr. L. Van Vestrant, the hon. secretary of the Association.

National Diplomas

The number of National Certificates and Diplomas in Electrical Engineering awarded in England and Wales by the Institution of Electrical Engineers in conjunction with the Board of Education for the last three years were as follows:—

	1929.	1930.	1931.
Ordinary Certificates	433	510	592
Higher Certificates	205	227	279
Post-Higher Certificates	4	3	8
Ordinary Diplomas	10	20	8
Higher Diplomas	4	4	3
Total number of successful students ..	656	764	890
Total number of failures	428	442	569

Appointments Vacant

Chief sales and showroom assistant for Worthing Electrical Department.

Civilian technical officer for the Royal Air Force Electrical and Wireless School, Cranwell.

Assistant technical engineer for Belfast Electricity Department.

Deputy borough electrical engineer and manager for Ilford Electricity Department.

(See our advertisement pages to-day.)

The Tees-side E.T.B.I. Ball

The second annual ball of the Tees-side Section of the Electrical Trades Benevolent Institution will be held at the Town Hall, Middlesbrough, on February 26th. Tickets (7s. 6d. single, or 15s. double), can be obtained from Mr. G. D. W. Middleton, the hon. secretary, Corporation Electricity Works, Snowdon Road, Middlesbrough, or from Mr. A. T. Griffiths, General Electric Co., Ltd., Magnet House, Corporation Road, Middlesbrough.

Modern Illumination

The annual dinner of the Illuminating Engineering Society was held last Tuesday at the Trocadero Restaurant, W. Mr. P. J. Pybus (Minister of Transport), proposing the toast of the Society, congratulated that body on the organisation of the floodlighting displays last autumn and regretted that the campaign had now ceased. In the U.S.A. he had noticed some very fine displays, but he thought too much use was made there of colour in floodlighting buildings not designed for it. He was especially interested in recent progress in the floodlighting of railway marshalling and sorting yards in Great Britain, which made for speed in operation and safety.

Sir Francis Goodenough, C.B.E. (President, I.E.S.) referred to the record attendance at the dinner, and attributed much of the Society's success to the work of Mr. J. S. Dow and his staff. He also especially mentioned the part played by Messrs. C. C. Paterson, C. W. Sully and P. Good, Col. Edgecumbe, and Col. Evans, in the recent international illumination congress, which had resulted in a financial gain for the Society. Col. Evans had been elected an honorary life member in recognition of his services.

Mr. C. W. Sully (vice-president, I.E.S.) proposed the health of the guests. He said that the representatives of the electrical and gas industries worked together for the technical improvement of illumination as such, without reference to the source of the illuminant.

Capt. J. M. Donaldson (president I.E.E.) and Mr. Sydney Tatchell (vice-president, R.I.B.A.) responded.

The dinner was followed by a dance that proved just as enjoyable as similar functions in previous years.

E.P.E.A. London Technical Group

The committee of the London Local Technical Group of the E.P.E.A. announces that Mr. H. W. Clothier's paper on "Protection of Grid Lines and Centrovisory Control," which was to have been delivered last Tuesday, will be given on Tuesday, April 12th.

The committee also announces that tickets for the dinner and dance, to be held at the Café Royal, Regent Street, on February 27th, are now available and can be obtained from the honorary secretary, Mr. W. F. Andrews, 14, Violet Road, Bow, E.3.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

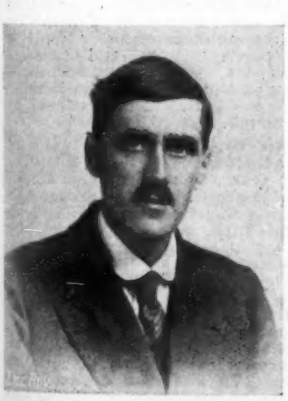
Mr. Vincent Alexander Pask, M.I.E.E., A.M.I.Mech.E., has been selected by the Norwich Corporation Electricity Committee for the appointment of city electrical engineer to succeed Mr. F. M. Long on his retirement in June next. Mr. Pask, who was born in Manchester, was educated in Preston and received his engineering training at the Preston Technical Schools and in the Tramway Department of the Preston Corporation. He subsequently served on the staffs of the Paisley, Hull and Bootle municipal electricity undertakings. In 1917 he was appointed chief inside assistant to the borough electrical engineer at Bootle, and in 1920 to his present position of deputy general manager and engineer of the Newcastle and District Electric Lighting Co., Ltd.

Mr. V. A. Pask, who is to succeed Mr. F. M. Long at Norwich at the end of June

At Newcastle under his supervision the fuel per kWh generated has been reduced by 40 per cent., and the mileage of the distribution system has been trebled. He is the representative of his company in the activities of the British Electrical Development Association, being a member of the Northern Counties Area Committee, and has also been the company's representative for the past ten years on the employers' side of the District Joint Council and District Joint Board No. 1 (North-East Coast Area).

Alderman Edward Huntsman, chairman of the Nottingham Electricity Committee and of the East Midlands Board, was presented at Nottingham on February 4th with a gift which had been subscribed for by his numerous friends in the East Midlands who have been associated with him in his work. The present consisted of volumes of the literary productions of Heine, and accompanying the gift was a letter expressing the pleasure which is felt that the alderman has recovered from the long illness from which he has been suffering. The presentation was made by Mr. G. W. Lake, city electrical engineer, who was accompanied by a representative deputation.

The Watford Electric Light and Power Committee has recommended the following increases of salary, which are to be considered by the Finance Committee:—**Mr. A. W. Barham,** chief engineer and general manager, to £1,507; **Mr. J. R. Jones,** chief assistant engineer and station superintendent, from £601 to £625; **Mr. J. E. Walley,** mains superintendent, from £536 to £560; **Mr. A. Webb,** commercial assistant, from £450 to £475; **Mr. H. Histed,** chief meter inspector, from £230 to £265.



Mr. R. O. Seville, who has been appointed city electrical engineer at Wakefield

Mr. R. O. Seville, B.Sc., A.M.I.C.E., has been appointed to succeed **Major H. G. Fraser,** M.C., the city electrical engineer of Wakefield, who has resigned to take up the position of city electrical engineer at Oxford. Mr. Seville was educated at the Stockport and Leeds Grammar Schools. He took the B.Sc. degree of Leeds University with engineering honours, and for five years was engaged on constructional engineering work for the Leeds Corporation. In 1918 he went to Wakefield as constructional engineer in charge of all extensions at the power station, and was appointed deputy city electrical engineer in 1927, after having been promoted to chief assistant in 1926. During his period of office the capacity of the station has been increased from 3,000 kW to 15,000 kW.

Mr. J. E. Kingsbury has been elected president of the Constantinople Telephone Co.

Mr. Dudley C. Apps, who has recently joined Messrs. Berry, Wiggins & Co., Ltd., has been appointed northern representative for their insulating compounds and anti-corrosive solutions.

Mr. W. M. Bailey, senior salesman at the Bradford Corporation showrooms, has been recommended by Worthing Corporation Electricity Committee for appointment to the position of chief sales and showroom attendant, and **Miss H. Bailey,** showroom assistant at Lincoln, is recommended for appointment as cooking demonstrator and showroom assistant.

Mr. G. E. Rowland has resigned his directorship of Agricultural & General Engineers, Ltd., and the directorships of any of its associated companies that he holds.

Mr. C. Cameron, A.M.I.E.E., has resigned from the staff of the English Electric Co., Ltd., to take up the appointment of switchgear sales manager with the Harland Engineering Co., Ltd.

Mr. J. H. Colmer, who has latterly been chief engineer at Messrs. Shoolbreds, London, has been appointed assistant secretary of the Association of Supervising Electrical Engineers. He will deal with the Association's educational and social activities.

At the annual general meeting of the Radio Manufacturers' Association, **Mr. Leslie McMichael,** A.M.I.E.E., was elected chairman. Mr. McMichael was educated at the Quaker School at Ackworth, Yorks, and was apprenticed in his father's electrical business in Birmingham. He was one of the first radio experimenters and several years before the War he organised the London Wireless Club, now the Radio Society of Great Britain, of which he is vice-president.

Mr. Adam Gowans Whyte, who has been appointed to the staff of the Director (Mr. A. C. Cramb) of the British Electrical Development Association, to be responsible for Press editorial and publicity work, was educated at Allan Glen's School, Glasgow, and Glasgow University, where he took the degree of B.Sc. in engineering in 1895. After three years on the *Glasgow Weekly Citizen* he came to London. In 1901 he was appointed editor of *Electrical Investments* (later *Electrical Industries*), in conjunction with which electrical publicity journals and literature have been produced for electricity supply undertakings and Press campaigns. He remained there until 1924, when he went to the Conservative Central Office. He was there engaged on special publicity work, mainly in connection with magazines, films, plays, and by-elections. He has written the following books on electrical subjects: "The Electrical Industry," "Electricity in Locomotion," "The All-Electric Age," and "Forty Years of Electrical Progress." He has also written several works of fiction, and scientific books for children. From time to time he has contributed to the *Fortnightly Review* and various electrical and other journals.

[Elliott & Fry

Mr. A. Gowans Whyte, the new Press and publicity officer of E.D.A.

Mr. O. W. Brain, M.I.E.E., Assistant Commissioner of Railways, New South Wales, has retired from active service in the Department.

Mr. R. W. Smith has been appointed employé managing director of Drake & Gorham Wholesale, Ltd.

Obituary

Mr. J. T. Murray.—The death occurred on February 4th, at the age of 50, of Mr. John T. Murray, formerly partner in the firm of Lewin & Murray, electrical engineers and contractors, Halifax. He began his electrical career with Mr. Walter Emmett and afterwards started on his own account. In 1914 he entered into partnership with Mr. A. Lewin, but he retired from it in 1929 owing to ill health.

Mr. H. H. Slack.—Our Canadian correspondent reports the death of Mr. Herbert Haslam Slack, president of the Wentworth Radio and Auto Supply Co., Ltd., of Hamilton, Ont., and a pioneer of the radio industry in Canada, at the age of 37 years. He was born in England and went to Canada when a young man.

Mr. R. J. Lawson, M.I.E.E., has retired from the post of assistant sectional engineer at Dundee Post Office, after serving for over 46 years.

Wills.—Mr. Walter Lanyon Nichols, a director of the Bideford and District Electric Supply Co., Ltd., left unsettled property in his own disposition of £258,124 (£202,906 net).

Mr. William Lee Matthews, a director of Thomas Bolton & Sons, left £43,285 (net personalty £42,455).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Servu, Ltd.—Private company. Registered February 3rd. Capital, £800 in £1 shares (250 preference and 550 ordinary). Objects: To carry on the business of electricians, mechanical engineers and manufacturers of and dealers in electricity, &c. The permanent directors are: W. J. Cameron, 8, Goddard Road, Beckenham, and S. Graves, 52, Durban Road, Beckenham.

Sentry Dry Battery Co., Ltd.—Private company. Registered February 2nd. Capital, £2,000 in 7,200 10 per cent. cumulative participating preference shares of 5s. and 4,000 ordinary shares of 1s. each. Objects: To carry on the business of electricians, electrical engineers, manufacturers of and dealers in electrical appliances, apparatus, &c. The subscribers are: T. F. Sanders, 41, Maberley Road, Upper Norwood, S.E.19, and A. W. Pears, 85, First Avenue, Manor Park, E.12. Registered office: Finsbury Pavement House, Finsbury Pavement, E.C.2.

Unalite, Ltd.—Private company. Registered February 3rd. Capital, £2,000 in £1 (1,000 7 per cent. cumulative preference and 1,000 ordinary) shares. Objects: To adopt an agreement with I. Simon and W. G. Bailey, trading as the Unalite Co., and to carry on the business of lighting specialists at 57, Theobald's Road, W.C.1, and that of manufacturers and merchants of all types of electrical apparatus, &c. The directors are: I. Simon, 59, Aberdeen Road, Highbury, N.5; W. G. Bailey, 43, Una House, Prince of Wales Road, Kentish Town, N.W.5, and E. J. Crooks, Dunelm, Bracklesham Bay, near Chichester, Sussex. Secretary: E. J. Crooks.

W.R.C., Ltd.—Private company. Registered February 1st. Capital, £5,000 in £1 shares. Objects: To carry on the business of manufacturers of, agents for and dealers in radio and electrical goods, &c. The subscribers are: A. Wilson, 62, Myddelton Square, E.C.1, and V. E. Davey, 77, Central Park Road, East Ham, E.6. Solicitors: Zeffertt & Heard, 17, Coleman Street, E.C.

Light Controlled Installations, Ltd.—Public company. Registered January 30th with a nominal capital of £1,000 in 5s. shares. Objects: To adopt an agreement with Saxon Securities (Amalgamated), Ltd., Universal & General Securities, Ltd., and Trinidad Oil Lands, Ltd., and to carry on the business of manufacturers of and dealers in plant, machinery and installations operated by light-sensitive cells for industrial, commercial or other purposes, magnetic, electrical, television and radio apparatus, electrical and general engineers, &c. The subscribers are: P. H. Brashier and H. E. Skan, both of 4, Copthall Chambers, E.C., and five others. Solicitors: Romer, Skan & Brashier, 4, Copthall Chambers, E.C.

Returns of Electrical Companies

Electric Reduction Co., Ltd.—Capital, £50,000 in 16,200 preference and 33,800 ordinary shares of £1 each. Return dated November 30th, 1931. 16,200 preference and 28,800 ordinary shares taken up. £18,000 paid on 13,000 preference and 5,000 ordinary shares. £27,000 considered as paid on 3,200 preference and 23,800 ordinary shares. Mortgages and charges: £25,000.

Simplex Conduits, Ltd.—Capital, £100,000 in 10,000 preference shares of £5 and 50,000 ordinary shares of £1 each. Return dated November 9th, 1931. 10,000 preference and 40,000 ordinary shares taken up. £50,000 paid on the preference shares. £40,000 considered as paid on the ordinary shares. Mortgages and charges: Nil.

Stearn Electric Co., Ltd.—Capital, £4,000 in £1 shares. Return dated October 20th, 1931. All shares taken up. £2 paid. £3,998 considered as paid. Mortgages and charges: £9,700.

Atlas Electric & General Trust, Ltd.—Capital, £6,500,000 in 3,000,000 preference, 3,000,000 ordinary and 500,000 unclassified shares of £1 each. Return dated November 19th, 1931. All the preference and ordinary shares taken up. £1,749,078 paid on 1,214,189 preference and 534,889 ordinary shares. £4,250,922 considered as paid on 1,785,811 preference and 2,465,111 ordinary shares. Mortgages and charges: £750,000.

British Brown-Boveri, Ltd.—Capital, £50,000 in £5 shares. Return dated December 1st, 1931. All shares taken up. £21,250 (£2 10s. per share) paid on 8,500 shares. £7,500 (£5 per share) considered as paid on 1,500 shares. Mortgages and charges: Nil.

Electric Development and Securities Trust, Ltd.—Mortgage dated January 27th to secure sums not exceeding at any time £500,000 charged (*inter alia*) on moneys which are or shall at any time be owing to the company from certain other companies. Holders: Prudential Assurance Co., Ltd.

Contal Radio, Ltd.—Issue on January 19th of £500 debentures, part of a series already registered.

Manor Radio, Ltd.—Particulars filed of debentures for sums not exceeding £200 authorised January 4th, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £200.

Bond Wholesale Electrical Co., Ltd.—Debenture dated January 6th to secure £150, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: H. W. Hives, 17, Sandhurst Road, Leicester.

Strange & Sons Electrical Engineering Co., Ltd.—Capital £200 in £1 shares. Return dated October 16th, 1931. 102 shares taken up. £102 paid. Mortgages and charges: Nil.

Arnold Goodwin, Ltd.—Issue on January 12th of £250 debentures, part of a series already registered.

C. A. Middleton, Ltd.—P. J. Goodchild, 19, London Wall, E.C., ceased to act as receiver and manager on January 18th.

Blackwells Electrical Supplies, Ltd.—Capital, £2,000 in £1 shares. Return dated December 28th, 1931. All shares taken up. £2 paid. £1,998 considered as paid. Mortgages and charges: Nil.

Ostron, Ltd.—Capital, £3,000 in 2,850 preference shares of £1 and 3,000 ordinary shares of 1s. each. Return dated September 22nd, 1931. All shares taken up. £3,000 paid. Mortgages and charges: £2,500.

Belshaw & Co., Ltd.—Capital, £3,000 in 2,000 preference and 1,000 ordinary shares of £1 each. Return dated November 25th, 1931. All shares taken up. £500 paid on 500 ordinary shares. £2,500 considered as paid on 2,000 preference and 500 ordinary shares. Mortgages and charges: £3,500 debentures.

Underground Electric Railway Co. of London, Ltd.—Satisfaction (*a*) to the extent of £1,000,000 on September 1st, 1911, of trust deed dated July 30th, 1908, securing prior lien bonds and registered August 4th, 1908; (*b*) to the extent of £3,000,000 on October 28th, 1928, of trust deed dated July 30th, 1908, securing 4½ per cent. bonds of 1933; and (*c*) to the extent of £6,500,000 on March 2nd, 1931, of trust deed dated July 30th, 1908, and supplemental trust deeds dated April 1st, 1912, and June 29th, 1914, securing 6 per cent. income bonds of 1948, and registered August 4th, 1908, April 4th, 1912, and July 16th, 1914, respectively.

British Labour Saving Devices, Ltd.—Debenture dated January 29th to secure £2,250, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: A. W. Scott, 7, Staple Inn, W.C.1.

City Notes

The London Power Co., Ltd., reports a total revenue of £2,147,131 for the year ended December 31st last, as compared with £2,043,388 in the preceding year. Expenses totalled £1,071,580 (£1,037,858), and after deducting debenture interest and sinking fund, writing £14,595 off debenture issue expenses, &c., the fixed dividend of 6 per cent. is paid on the ordinary shares.

The annual meeting was held on February 5th, when Mr. W. F. Fladgate, who presided, said that the capital expenditure had amounted to £2,000,000 on plant and buildings at various power stations, and also the necessary interconnecting mains. The output for the year amounted to 900,000,000 kWh, the percentage of increase over the preceding year being about 9.8. Substantial supplies were furnished to the Central Electricity Board from the Willesden power station, and arrangements were complete for further supplies from the Deptford West station as soon as the Board was in a position to receive them. Their operating cost per kWh of output for 1930 averaged 0.2265d., and in 1931 this figure was reduced to 0.2176d. The total costs for 1930 were 0.5888d. per kWh and 0.5608d. for 1931, a reduction of 4¾ per cent. The progress of the installation of new plant had been maintained at a rate sufficient to enable the company to fulfil its obligations. The extensions to the buildings of the Deptford West station had been completed, and the new 35,000-kW unit with the first portion of the complementary boiler plant had been brought into commission. In the last published returns of the Electricity Commissioners this station took second place in the whole country for thermal efficiency. It was anticipated that the first section of the Battersea station would be in commercial operation by the spring of 1933. They had entered into contracts for the provision of four steam colliers of 2,000 tons capacity. Satisfactory progress was being made with the installation of the new 66,000-V transmission system. Mains of this voltage had been laid between Deptford and Battersea and between Battersea and Willesden. Mr. O. Bury, nominated by the London Electric Supply Co., had been elected a member of the Management Committee to fill the vacancy caused by the retirement of Lord Bessborough.

The Yorkshire Electric Power Co. reports a net profit of £357,917 for the year ended December 31st last, as compared with £342,558 in the preceding year. To this is added £83,501 brought forward, making £441,418 available. It is proposed to place £100,000 to reserve, bringing this fund up to £775,000, to transfer £38,000 to plant renewals fund, and to pay an ordinary dividend of 8 per cent., less tax at 5s., leaving £80,383 to be carried forward. The report states that the sales of electricity increased from 194,995,000 kWh in 1930 to 203,507,624 kWh in 1931. The continued increase in the use of electricity for domestic purposes accounts for a substantial addition to the amount sold in bulk to authorised distributors. Despite increased taxes, working expenses have been reduced by economies in operation and greater efficiency, and there has been an increase in net revenue. The extension of the Thornhill power station has progressed satisfactorily during the year and it is nearly completed. Extensions have been made to the transmission system to provide for growing demands. Encouragement has been given to new uses of electricity, and the advantages of the company's area as a site for new industries has been brought to the attention of many overseas manufacturers considering the establishment of works in this country. In this connection the company has included in its report a pamphlet printed in English, French and German, briefly outlining the advantages of its area as an industrial centre, together with a map of Great Britain, showing in colour the area covered by the company. The Special Order authorising the company to supply electricity in parts of Lincolnshire and the East Riding is now before the Minister of Transport. Mr. W. A. Crowther has been elected a director, and Mr. Osbert Peake has been appointed to the board to fill the vacancy caused by the resignation of Mr. G. H. Peake. Meeting: February 16th.

The Ever Ready Trust Co., Ltd., held its annual meeting on February 1st, Mr. M. Goodfellow (chairman) presiding. In presenting the report and accounts (ELECT. REV., January 15th, page 105), the chairman said in January, 1931, a circular letter was issued to shareholders stating that the time was approaching when it might be possible to sell advantageously a substantial amount of the company's holding of preference shares in Lissen, Ltd. Fortunately the negotiations fell through. If they had reinvested a large sum in January or February a year ago they would have sustained heavy depreciation. Under present world conditions they were in a happy position in that their investments were in British industrial companies. They did not recommend a distribution on the deferred shares, the bulk of which were held by the Ever Ready Co. (Great Britain), Ltd., as they preferred to leave the money in the company with a view to further strengthening its position. As there would be no further writing-off of preliminary expenses, next year there should be a substantial increase in the amount of net income available for reserves and dividend. The report and accounts were adopted, and at an extraordinary meeting which followed resolutions were passed altering certain of the articles of association.

Allen West & Co., Ltd., report a loss of £30,161 for the year ended July 31st last, as compared with a profit of £54,443 in the preceding year. Deducting the loss from the amount brought in (£75,063), and adding income-tax credit (£1,747), a sum of £46,655 is available. After setting £15,000 aside for depreciation and paying the preference dividend, £10,655 is carried forward. No dividend is recommended on the ordinary shares (against 6 per cent.). The report states that in addition to the depressed world-wide trade conditions, the values of all raw materials were at a very low level, and values were written down during the year involving a heavy charge against the trading account. The whole of the expenditure in Maquinaria Electrica Allen West S.A.E. was written off in view of the conditions in Spain, and the cost of increasing the capital (£12,080) has also been written off out of capital reserve. The business of Derby Cables, Ltd., in which the company owns the controlling interest, is stated to be increasing rapidly and earning very satisfactory profits. Meeting: February 16th.

The Singapore Traction Co., Ltd.—Presiding at the annual meeting on February 3rd, Mr. L. W. Hawkins (chairman), in the course of his speech, said the accounts covered a period of unexampled depression, Singapore being subject to it in a special degree in its staple industries, rubber and tin. Since the last meeting there had been a downward tendency in gross receipts, and a more marked decline in operating profits, and there was no sign of improvement. Gross receipts fell by £5,000, as compared with the preceding year, and the decline of nearly £7,000 in operating profits was attributed to that and to slightly increased operating expenses due to the larger car-mileage run. Although operating expenses had increased in the aggregate, they showed an appreciable reduction per car-mile. They were able to recommend a year's dividend on the 7 per cent. preference shares, but at the present time the full dividend on those shares was not being earned. The financial position of the company was good.

The Power Securities Corporation, Ltd., reports a gross income of £135,279 for 1931, as compared with £122,316 in the preceding year, and a net profit of £92,298 (against £81,655), to which is added £20,699 brought in, making £112,997 available. It is proposed to place £29,493 to reserve (£25,000), and to pay a dividend of 7 per cent. on the old ordinary capital, and a dividend at the rate of 7 per cent. per annum on the 30,000 ordinary shares issued in July last, leaving £25,332 to be carried forward. The directors are of opinion that the value of the whole of the company's investments, including those in subsidiary companies, is in the aggregate in excess of the balance sheet figure (£1,743,179). Meeting: February 17th.

Stewarts & Lloyds, Ltd.—Extraordinary meetings of the holders of the different classes of shares in the company and an extraordinary meeting of the company were held on February 8th when resolutions were passed giving effect to the agreement entered into with the directors and shareholders of the Scottish Tube Co. for the acquisition of the shares of that company in exchange for shares in Stewarts & Lloyds, and for splitting the existing 6 per cent. cumulative preference shares of £10 each and the 10 per cent. preferred ordinary shares of £10 each into shares of £1 each to be known as cumulative first preference shares and cumulative second preference shares respectively.

Companies Struck off the Register.—The names of the undermentioned companies have been struck off the Register, and they are thereby dissolved:—

Cheap Electric Power Corporation, Ltd.
Electro-Vortex, Ltd.
Illuminated Moving Signs, Ltd.
Miller Electrical Organisation, Ltd.
Quadrant Electric Co., Ltd.

Hall Telephone Accessories (1928), Ltd., reports a net profit for 1931 of £49,413, as compared with £68,075 for the previous year. Reserves receive £27,500, and a final dividend of 5 per cent. is recommended, together with a bonus of 2½ per cent., making 12½ per cent. for the year (against 15 per cent.). The amount carried forward is £6,681 (£6,398).

The Northampton Electric Light and Power Co., Ltd., has recommended final dividends for the year ended December 31st last of 2½ per cent. on the 5 per cent. preference shares (making 5 per cent. for the year), and 6 per cent. on the ordinary shares (making 10 per cent. for the year). Annual meeting: February 26th.

The Rushden & District Electric Supply Co., Ltd., is to pay a final dividend of 4½ per cent., making 8 per cent. for the year ended December 31st. Annual meeting: February 26th.

The Tyneside Tramways & Tramroads Co. reports a profit for the year ended December 31st last of £6,065. After deducting mortgage interest, writing £500 off cost of Parliamentary Act, 1929, and transferring £1,280 to prior mortgage redemption fund, there is a balance of £89, to which is added £162 brought in, making £251, which is carried forward.

The Dublin United Tramways Co., Ltd., announces that, after allowing £20,000 for mortgage and debenture redemption and £25,000 for track renewals, it is proposed to pay an ordinary dividend of 3 per cent. for 1931 (same), leaving £12,051 to be carried forward (against £12,103 in 1930).

The Consolidated Gas, Electric Light & Power Co. of Baltimore reports a gross operating revenue of $28,499,247, as compared with $28,582,423 in 1930, and a net income of $10,227,718, or $5.21 per common share, against $10,040,363 and $5.42, respectively.

The York Town (Camberley) & District Gas & Electricity Co. reports a gross profit for 1931 of £19,491, as against £19,293 in the preceding year. A dividend of 6½ per cent. is recommended on the consolidated ordinary stock, less tax (same), and £10,865 is carried forward.

The Westminster Electric Supply Corporation, Ltd., has declared a final dividend on the ordinary shares of 13.12d. per share, making the company's standard dividend for 1931 of 1s. 9.12d. per share.

The Telegraph Construction & Maintenance Co., Ltd., has announced that the trading result for 1931 does not permit of the payment of a dividend. For 1930 a dividend of 7½ per cent., tax free, was paid.

The Electrical & Industrial Investment Co., Ltd., has recommended a dividend of 8 per cent., less tax at 5s., on the deferred ordinary stock for the year 1931 (same).

The Midland Electric Manufacturing Co., Ltd., has recommended a dividend of 10 per cent. on the ordinary shares, plus a bonus of 12½ per cent., for 1931 (same).

The Pennsylvania Water & Power Co. reports a gross revenue of $5,064,070 for 1931, as compared with $4,835,558 in 1930, and after deducting operating expenses and fixed charges, and appropriating $358,407 for reserve for renewals, there is a net balance available for dividends of $2,056,141. Dividends of 3 per cent. have again been paid, leaving a surplus of $766,597 ($668,253).

The City of Buenos Ayres Tramways Co. (1904), Ltd., in its report for 1931, states that the annuity of £70,660 payable by the Anglo-Argentine Tramways Co. has been received, and the reserve balance is £71,718 (against £70,590). As was mentioned in our last issue, the final distribution is 1s. 3d. per share, making 5 per cent. for the year, and £1,809 is carried forward.

The Canadian Hydro-Electric Corporation, Ltd., has declared the regular quarterly dividend of $1.50 per share on the 6 per cent. cumulative first preferred stock, payable March 1st.

The Electrolytic Zinc Co. of Australasia, Ltd., has decided to pay a dividend at the rate of 8 per cent. per annum for the half-year to December 31st, 1930, on the 8 per cent. cumulative participating preference shares. The last ordinary dividend was in 1929-30, when 10 per cent. was paid.

Stocks and Shares

TUESDAY EVENING.

THE issue of £7,000,000 Central Electricity 5 per cent. stock which was made at 95 proved to be too substantial an amount for the public to digest all at once. The result appeared in the underwriters being left with 84½ per cent. of the total: that is to say, the public took about £1,100,000 of the £7,000,000 stock offered. The opening price reflected the result with a discount of 1½ per cent. Underwriters received 1 per cent. commission. The public demand for gilt-edged securities is such, however, as to make it tolerably certain that the underwriters' stock will find a home before long, and that this new 5 per cent. issue will advance above its issue price. Any reduction in Bank Rate would accelerate its upward progress, the stock being of a nature which appeals to the permanent investor. The fact of its being transferable, at present, free of stamp and fee, makes an additional point in its favour. The result of the issue spread a certain amount of dullness amongst other gilt-edged stocks, though neither the Central Board's nor the London J.E.A.'s 4½ per cent. debenture issues are nominally affected. Both stocks remain at 87. When money became a little dearer, on this Tuesday evening, the 5 per cent. scrip went back to 2 discount.

"Money" Stocks

The reason for the generally abiding strength of safety-first securities lies in the fact that speculation is too dormant for people to know what to do with money for which they are prepared to find temporary employment. Stock Exchange markets offer few opportunities for making a profit on the rise, and the consequence is that continually accumulating funds are forced into the purely gilt-edged stocks, prices of which are scarcely likely to go down to any extent, and which, at present levels, offer 5 to 5½ per cent. on the money. In many quarters it is contended that these safety-first stocks stand too high in view of the departure of this country from the gold standard, with its suggestion of the attractions of ordinary stocks and shares. The fact remains, however, that capital is extremely cautious of venturing outside the circle of safety. In view of the certainty that Bank Rate will be eventually lowered, followed by reduction in the rates paid by banks on deposit money, the tendency of money will continue to drift towards the gilt-edged stocks, of which those of the electricity authorities and the shares of the London supply companies make good illustrations.

"Equities"

A prominent firm of Stock Exchange brokers closely identified with arbitrage business between London and New York has published for circulation amongst its clients a spirited defence of inflation as a remedy for the financial ills from which the world is at present suffering. The firm would start printing presses to work in a manner which would raise wages and prices, though it would have the effect of reducing the value of money and money stocks. For a temporary, present-day policy, it is said that gilt-edged stocks should be sold, the money to be reinvested in such industrial shares as those of the Associated Electrical Industries, Callender's, Henley's, Babcock & Wilcox, General Electrics—amongst a dozen and a half of companies whose shares are selected as examples of the issues likely to benefit by any pronounced improvement in trade, brought about by such inflation of currency as they suggest. The pamphlet has attracted attention by reason of its courage and the provocative character of the proposals set out, for it is very certain that many people will decline advocacy of the inflation policy that forms part of the plan. The Government's proposals for the imposition of tariffs has had practically no effect in the markets, having been well discounted in advance. Speculative investment recognises that some time must elapse before any concrete effect will be seen from the putting into operation of the tariffs now propounded.

Home Railway Stocks

The weakness which occurred in prices of Metropolitan consolidated and other of the Tube Railway group upon the disappointing dividend declared by the Metropolitan Railway has not yet been effaced. Prices continue heavy, in spite of a tolerably satisfactory dividend from the Southern Railway. The latter company has announced a dividend making 4 per cent. for the year on its 5 per cent. preferred ordinary stock, and, although this means the retreat of its prior charge issues from being strict trustee securities into the slightly less exalted list of Chancery trust stocks, the showing must be accounted good, having regard to the traffic decreases published last year. The Underground group of companies announce their dividends on the Thursday in this week, when statements will be made by the District, London Electric, City & South London, Central London and others in the combine. As already observed, there seems to be some little doubt felt as to whether the Underground will be able to maintain its previously paid 8 per cent. dividend on the shares, and the element of uncertainty has been extended to District stock, which for 1930 received 5 per cent.

Home Electricity Supply

The London Electric, the Chelsea, and the St. James's & Pall Mall, are expected to be the three next companies which will allot to their shareholders new shares in respect of the capitalisation of reserves. At present, the companies which have distributed their new shares are the Charing Cross, Westminster and Metropolitan. Others will follow in due course. Prices of the new shares are maintained in close correspondence with those of the senior issues of shares. London Electrics on the week are 6d. better at 33s. 6d. New shares are quoted at 25s. 6d. for Westminsters, 26s. 6d. for Charing Cross, and 37s. 6d. for Metropolitans. Business in the shares of the provincial companies is as quiet as is that in the London group. Yorkshire Electrics advanced to 31s. 3d., affording a yield on the shares at the present price, and on the basis of the previously paid 8 per cent. dividend, of £5 2s. 5d. per cent. A line of Electrical Distribution of Yorkshire ordinary came to market at 31s. 7½d. The final dividend for 1931 is due next month, and the yield on the money comes to 5¾ per cent., assuming payment of the 9 per cent. annual dividend distributed for the past half-decade.

Cables and Wireless

Weakness has again broken out in the stocks of the Cables and Wireless trio. This is due to the fear lest the company's 5½ per cent. preference stock will have to go short of any dividend in respect of 1931. The figures are not due until July this year, but appeal has been made to the combine for some earlier pronouncement in regard to earnings, such as will enable shareholders to know, before July, whether they will receive any return on their money in respect of last year's working. The flatness of cable stocks is reflected in a further drop of £1 in Globe Telegraph and Trust ordinary. This has taken the price to £6, the 6 per cent. preference remaining without change at 7. American Telephone and Telegraph shares at 165 are 5 points down, and Internationals weakened to 13. Great Northern Telegraphs at 22½ are 10s. better. On the other hand, Marconi Marines have gone back to 30s. 9d.

The annual report of Hall's Telephone Accessories, showing reduction in profits and dividend, brought down the price from 17s. to the neighbourhood of 14s. 6d. The list of prices of the manufacturing and equipment companies is almost unchanged. The hope continues to be expressed that the Central Electricity Board will place substantial contracts now that it has raised so large a sum of money through its new issue of stock. The Telegraph Construction Company has passed its final dividend, and the price of the shares is dull at 10. Henley's debenture stock has hardened to 91½, and the shares are better at 98s. 9d. British Aluminium are a good market, with a rise to 25s. 9d. Atlas ordinary at 10s. 9d. and the preference at 20s. 9d. are inclined to be dull. On the tariff debates, Vickers lost a few pence, receding to 8s. 6d. Other shares in the same industry are somewhat reactionary.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1929.	1930.	Price, Feb. 9, 1931.	Rise or Fall.	Yield p.a. £ s. d.
Home Electricity Companies						
Bournemouth and Poole		15	15	57/6	—	5 4 4
Brompton Ordinary		8½	8½	27/6	—	5 1 0
Central Electricity 4½% Deb.	Stock	—	4½	87	—	5 3 6
Charing Cross Ordinary	1	8½	8½	28/-	—	5 0 0
Chelsea	1	8½	8½	26/-	—	5 7 8
City of London	1	10	10	33/9	—	5 17 10
Clyde Valley	1	8	8	31/3	—	5 2 5
County of London	1	11	11	44/6	—	4 18 10
Edmundsons' 7% Pref.	1	7	7	23/6	—	5 19 2
Elec. Supply Corporation	1	11	11	42/6	+¼	5 3 6
Kensington Ordinary	1	8	8	29/-	—	4 16 7
Lancs. Light and Power	1	7	6½	24/6	—	5 6 0
London & Home Counties 4½% Deb.	Stock	—	4½	87	—	5 3 6
London Electric	1	8½	9	33/6	+6d.	5 7 6
Metropolitan	1	9	10	38/9	—	5 3 3
Midland Counties	1	6½	7	27/-	—	5 3 3
Mid. Elec. Power	1	15	8	28/9	—	5 11 4
Newcastle-on-Tyne Ordinary	1	6	6	23/3	—	5 3 3
Do. 7% Pref.	1	7	7	26/-	—	5 7 6
Notting Hill 6% Pref.	10	6	6	10½	—	5 14 3
North Met. Elec. 6% Pref.	1	6	6	22/6	—	5 6 8
St. James' and Pall Mall	1	8	8	28/6	—	4 18 3
Scottish Power	1	8	8	27/-	—	5 18 5
South London	1	8½	8½	25/6	—	5 9 8
Urban Ordinary	1	7	7	27/-	—	5 3 3
Westminster Ordinary	1	8½	8½	26/-	—	5 7 8
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/-	—	7 2 10
Yorkshire Elec.	1	8	8	31/3	+6d.	5 2 5
Home Rails						
Central London Ord. Assented	Stock	4	4	66½	—	6 0
Metropolitan	,,	4	3½	35½	—	9 17 2
Do. District	,,	5	5	55½	—	9 0 2
Underground Electric	1	8	8	18/6	—	8 13 0
Telegraphs and Telephones						
Anglo-Am. Tel. Pref.	Stock	6	6	90	—	6 13 4
Do. Def.	,,	1½	1½	21	—	6 19 6
Cables & Wireless 5½% Pref.	Stock	5½	5½	45½	–3	—
Do. A 7½% Ord.	,,	Nil	—	15	–2½	—
Do. B Ord.	,,	Nil	—	10	–½	—
Globe Tel. and T. Ord.	10	10	8½	6	–1	—
Do. do. Pref.	10	6	6	7	—	8 11 6
Great Northern Tel.	10	20	20	22½	+½	8 18 6
Marconi-Marine	1	15	15	30/9	–6d.	9 15 0
Oriental Telephone Ord.	1	12	12	2½	—	*5 16 0
Home and Foreign Trams, etc.						
Anglo-Arg. Trams First Pref.	5	5½	—	6/3	—	—
Do. do. 2nd Pref.	5	6	—	8/9	—	—
Do. do. 5% Deb.	Stock	5	5	14½	—	—
British Electric Traction Def. Ord.	,,	5	5	675	—	—
Do. do. Pref. Ord.	,,	8	8	110	—	7 5 6
Brazil Traction	100	8	—	15½	—½	6 9 0
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	82½	—	6 1 5
London & Sub. Trac. 5% Pref.	1	Nil	Nil	8/3	—	—
London United Tram Deb.	Stock	4	4	55½	—	7 4 2
Mexico Trams, 5% Bonds	—	5	5	32½	—	15 7 8
Mexican Light Common	100	Nil	Nil	22½	—	—
Do. 7% Pref.	100	7	7	30½	—	22 19 0
Do. 1st Bonds	—	5	5	60½	—	8 5 4
Victoria Falls Ord.	1	15	15	55/-	—	5 9 1
Yorkshire (West Riding)	1	Nil	Nil	6/3	—	—
Manufacturing Companies						
Assoc. Elec. Ord.	1	6	6	1	—	6 0 0
Do. Pref.	1	8	8	26/3	—	6 2 0
Babcock & Wilcox	1	15	14	43/9	—	*6 8 0
British Aluminium Ord.	1	10	10	25/9	+½	7 15 4
British Insulated Ord.	1	15	15	2½	—	5 11 7
Brush Ord.	Stock	10	5	60	—	8 6 8
Callender's	1	15	15	2½	—	6 3 1
Do. 6½% Pref.	1	6½	6½	22/6	—	5 15 5
Crompton Parkinson Ord.	5/-	30	30	18/9	—	8 0 0
Do. 8% Pref.	1	8	8	26/3	—	6 2 0
Edison-Swan 1st Pref.	1	7½	7½	23/3	—	6 9 0
Do. 5% Deb.	Stock	5	5	89½	—	5 11 10
Electric Construction	1	5	Nil	7/6	—	—
Enfield Cable Ord.	1	25	25	3½	—	6 8 10
English Electric	1	Nil	Nil	7/6	—	—
Do. do. Pref.	1	Nil	Nil	7/6	—	—
Ferranti Pref.	1	7	7	20/9	—	6 15 9
G.E.C. Pref.	1	6½	6½	23/-	—	5 13 1
Do. Ord.	1	14	10	41/3	—	4 16 10
Henley's	1	30	30	4½	+¼	6 1 5
Do. 4½% Pref.	5	4½	4½	4½	—	5 0 1
India-Rubber	1	Nil	Nil	5/9	—	—
Johnson & Phillips	1	10	10	23/9	—	8 8 5
Siemens Ord.	1	7½	7½	21/3	—	7 1 2
Telegraph Construction	12	10	7½	10	—	9 0 0

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1929

32,825. "Secondary or storage batteries." J. J. Drumm and Celia, Ltd. July 17th, 1930. (365,125.)

1930

8,034. "Electric long-distance indicating systems." H. Scheidegger. July 12th, 1930. (365,128.)

17,948. "Electric transformers." Allmanna Svenska Elektriska Aktiebolaget. Feb. 4th, 1930. (365,129.)

20,684. "Automatic and semi-automatic telephone plants." Telefonaktiebolaget L. M. Ericsson. July 9th, 1929. (365,032.)

24,279. "Electric cut outs." Edison Swan Electric Co., Ltd. and F. Shergold. Aug. 13th, 1930. (365,133.)

27,023. "Electrodeposition of copper." Copper Deoxidation Corporation. September 18th, 1929. (365,052.)

27,311. "Wave filters." Siemens & Halske Akt.-Ges. October 14th, 1929. (Addition to 25,958/30.) (365,053.)

27,322. "Electrical gauges." British Thomson-Houston Co., Ltd. September 12th, 1929. (365,138.)

27,405. "Electric measuring instruments." British Thomson-Houston Co., Ltd. September 13th, 1929. (365,139.)

29,657. "Telemetering systems." British Thomson-Houston Co., Ltd. October 5th, 1929. (365,142.)

29,898. "Remote control apparatus for electric current." D. A. Martin and J. Scott. October 7th, 1930. (365,146.)

30,010. "Treatment of hydrocarbons in the electric arc." J. Y. Johnson (I.G. Farbenindustrie Akt.-Ges.). October 7th, 1930. (365,045.)

30,013. "Gaseous electric discharge devices." British Thomson-Houston Co., Ltd. October 7th, 1929. (365,147.)

30,244. Arrangement for controlling the electric driving motor of a steerable road vehicle." Akt.-Ges. Brown Boverie & Cie. October 9th, 1929. (365,071.)

30,247. "Distributors for telegraph or like signalling systems." Standard Telephones & Cables, Ltd., and A. T. Starr. October 9th, 1930. (365,072.)

30,267. "Cathode-ray compasses and clinometers." International General Elec. Co. October 9th, 1929. (365,073.)

30,288. "Rontgen-ray apparatus." Koch & Sterzel Akt.-Ges. October 10th, 1929. (365,150.)

30,602. "Automatic regulation of machine sets comprising a prime mover and an electric generator." Siemens-Schuckertwerke Akt.-Ges. July 26th, 1930. (365,156.)

30,637. "Signal and control systems for elevators, hoists, and the like." Associated Electrical Industries, Ltd. October 11th, 1929. (365,157.)

30,750. "Magnetic cores for electrical apparatus." Siemens & Halske Akt.-Ges. December 17th, 1929. (365,160.)

30,909. "Electrical signalling systems." Automatic Telephone Manufacturing Co., Ltd., T. R. Rayner, and G. A. Burns. October 15th, 1930. (365,095.)

30,977. "Amplifying arrangement for telephone signals or the like." Standard Telephones & Cables, Ltd., and A. W. Montgomery. October 16th, 1930. (365,163.)

30,995. "Electro-optical systems, such as television or picture transmission systems." Electrical Research Products, Inc. October 25th, 1929. (365,166.)

31,060. "Electric switch or coupling devices." W. W. Wall. October 17th, 1930. (365,171.)

31,196. "Electric motor control systems." Electrical Research Products, Inc. October 23rd, 1929. (365,174.)

31,197. "Machines for the manufacture of electric cables." Compagnie Générale d'Electricité. November 30th, 1929. (365,175.)

31,259. "Electric tumbler switches." H. L. Bentley and A. G. Ash. October 18th, 1930. (365,176.)

31,260. "Electric tumbler switches." H. L. Bentley and A. G. Ash. October 18th, 1930. (365,177.)

31,501. "Reproduction on a reduced scale of the voltage of a high voltage a.c. system." A. Reyrolle & Co., Ltd., and H. Leben. October 21st, 1930. (365,194.)

31,728. "Method and self-driving apparatus for generating electric power." F. A. Knapp. October 22nd, 1930. (365,209.)

31,861. "Electric switches." Scintilla Akt.-Ges. December 5th, 1929. (365,210.)

32,006. "Elastic-fluid turbines driving electric generators." English Electric Co., Ltd., A. H. Law, and J. P. Chittenden. October 24th, 1930. (365,213.)

32,744. "Electric lamps." C. E. McLeod and C. Scheggia. October 31st, 1930. (365,223.)

33,252. "Automatic capping and paraffining machine for the manufacture of electric primary cells for pocket lamp and the like batteries." W. Hasse. November 5th, 1930. (365,229.)

33,432. "Plate shaped elements for dry rectifiers." Siemens-Schuckertwerke Akt.-Ges. November 9th, 1929. (365,232.)

34,064. "Television and like systems." J. L. Baird and Baird Television, Ltd. November 12th, 1930. (Cognate application 23,895/31.) (365,241.)

34,238. "Control systems for electric motors." Westinghouse Electric & Manufacturing Co. November 13th, 1929. (365,244.)

35,750. "Microphone supports." Duramin Engineering Co., Ltd., and E. L. Oglethorpe. December 5th, 1930. (365,260.)

36,957. "Electric batteries." Ever Ready Co. (Great Britain), Ltd., and A. H. Sheppard. December 8th, 1930. (365,262.)

37,943. "Oil-filled electric cables." Siemens-Schuckertwerke Akt.-Ges. March 7th, 1930. (365,271.)

38,178. "Switch-plugs." C. L. Arnold and M. K. Electric, Ltd. December 18th, 1930. (365,275.)

38,697. "X-ray tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. January 16th, 1930. (365,285.)

39,643. "Accumulator charging apparatus in economical connection." H. Nowak. December 27th, 1929. (365,287.)

1931

67. "X-ray tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 13th, 1930. (Addition to 365,285.) (365,297.)

232. "Ventilating means for containers of oil-immersed electric circuit-interrupters and like liquid-filled receptacles." H. Pearce and Associated Electrical Industries, Ltd. January 2nd, 1931. (365,298.)

395. "Electron tube with incandescent cathode." J. Kremenezky. January 8th, 1930. (365,303.)

592. "Tuning devices for use with wireless receiving apparatus." J. F. Sudder. January 7th, 1931. (365,306.)

794. "Thermally acting electric protective devices." Siemens Bros. & Co., Ltd., and C. R. Riber. January 9th, 1931. (365,307.)

895. "Electrical musical instruments." Westinghouse Electric & Manufacturing Co. January 20th, 1930. (365,309.)

935. "Traffic-control apparatus." Chance Bros. & Co., Ltd., and J. H. Abbink-Spaink. January 10th, 1931. (Cognate application 2,006/31.) (365,310.)

1,004. "Automatic capping and paraffining machine for the manufacture of electric primary cells for pocket lamp and the like batteries." W. Hasse. January 12th, 1931. (Addition to 365,229.) (365,311.)

3,165. "Electric control systems for electric railways." British Thomson-Houston Co., Ltd. January 31st, 1930. (365,340.)

3,566. "Signal and like recording systems." Marconi's Wireless Telegraph Co., Ltd. February 4th, 1930. (365,345.)

6,902. "Rail contact devices." J. Pintch Akt.-Ges. March 7th, 1930. (365,389.)

7,390. "Apparatus for regulating the volume of sound produced in gramophones and similar apparatus employing electric amplifiers." J. Bethenod. April 12th, 1930. (365,392.)

7,575. "Electrically heated hollow ware." H. G. Moseley and H. Pearson. March 12th, 1931. (365,394.)

7,696. "Automatic telephone exchanges." Telefonaktiebolaget L. M. Ericsson. March 15th, 1930. (365,396.)

9,412. "Electrolytic oxidation of aldoses." W. W. Triggs (Rohm & Haas Co.). March 27th, 1931. (365,414.)

10,854. "Electric discharge tubes." Siemens-Reimiger-Veifa Ges. für Medizinische Technik. April 24th, 1930. (365,432.)

11,268. "Luminous electric discharge tubes." General Electric Co., Ltd. July 9th, 1930. (365,434.)

11,269. "Manufacture of electric incandescent lamps and the like." General Electric Co., Ltd. May 22nd, 1930. (365,435.)

12,154. "Method of operating electrical machines in spaces containing an explosive atmosphere and construction of such machines." Maschinenfabrik Oerlikon. May 21st, 1930. (365,440.)

12,356. "Dynamo-electric machines." R. Bosch Akt.-Ges. January 2nd, 1931. (365,442.)

12,955. "Electric incandescent lamps." Ever Ready Co. (Great Britain), Ltd., and J. Thornton. May 1st, 1931. (365,447.)

13,083. "Secondary electric batteries." Pritchett & Gold & E.P.S. Co., Ltd., and E. S. Chapman. May 4th, 1931. (365,449.)

16,253. "Electric toy railway tracks." F. Ottenstein. June 24th, 1930. (365,470.)

16,272. "Luminous electric discharge tubes." General Electric Co., Ltd. July 5th, 1930. (365,471.)

17,803. "Anode for large mercury-vapour rectifiers." Maschinenfabrik Oerlikon. June 27th, 1930. (365,479.)

18,479. "Automatic regulators for dynamo-electric machines." R. Bosch Akt.-Ges. June 27th, 1930. (365,482.)

18,651. "Protective means for massive metal parts against stray magnetic fields." Akt.-Ges. Brown Boveri et Cie. June 27th, 1930. (365,483.)

19,665. "Advertising and like devices comprising a plurality of luminous electric tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. July 29th, 1930. (365,488.)

19,788. "Exercising apparatus embodying electric motors." International General Electric Co., Inc. July 10th, 1930. (365,489.)

28,884. "Receiving devices for light signals." C. Zeiss. October 21st, 1930. (365,508.)

34,763. "Thermionic cathodes of vacuum electric tube devices." E. Y. Robinson, F. Barton, and Associated Electrical Industries, Ltd. August 13th, 1930. (Divided application on 24,707/30.) (365,185.)

Trade Mark Applications

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from the dates mentioned :—

January 27th

Chirotherm. No. 526,068. Class 11. Apparatus for surgical diathermy.—Watson & Sons (Electro-Medical), Ltd., 43-47, Parker Street, Kingsway, W.C.2.

February 3rd

Reylik. No. 518,591. Class 8. Radio-telephonic apparatus and parts thereof, &c.—Arthur Walter Green, 70, High Holborn, W.C.1.

Abbirko. No. 529,490. All goods in Class 8, with certain exceptions.—Abbott, Birks & Co., 113, Newington Causeway, S.E.1.

Decaura. No. 527,693. Class 8. Electrically illuminated signs, &c.—Decaura Glass & Sign Co., Ltd., 12, Emerald Street, W.C.1.

Emicol. No. 528,086. Class 8. Electrical measuring instruments and apparatus, and parts thereof.—Electrical Measuring Instrument Co., Ltd., 55, Cardington Street, Hampstead Road, N.W.1.

Credenda. No. 528,285. Class 8. Electric cables and flexibles. —Credenda Conduits Co., Ltd., Oldbury, Birmingham.

Atmospheric Pollution

The seventeenth report on the Investigation of Atmospheric Pollution for the year ended March 31st, 1931, has been issued by the Department of Scientific and Industrial Research (H.M. Stationery Office, 5s. 6d. net). This was referred to in our leading columns last week.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Accrington.—Houses (24), Richmond Hill Estate; borough surveyor.

Ashford (KENT).—Houses (76); U.D.C. surveyor.

Bannockburn (STIRLINGSHIRE).—Picture house; C. Anderson.

Beddington & Wallington (SURREY).—Houses (62) for the U.D.C.; surveyor.

Billingham-on-Tees.—Baths for the U.D.C. (£14,000); Kitching and Co., architects, 21, Albert Road, Middlesbrough.

Bilston (STAFFS).—New Villiers School (£16,798), for the E.C.; director of education.

Blackpool.—Houses (57), Weymouth Road; Pimley & Topping. Development, Pelham Mount Estate; F. T. Waddington & Son, architects.

Bolton.—Houses (170) and flats (8), Cameron Street Estate (£58,230); W. Townson & Sons, Ltd. Houses (46), Albert Road Estate; A. S. Woods.

Brentford.—Factory, Gunnersbury Avenue; Power Construction Co.

Brighton.—Houses (566), Whitehawk, for the T.C.; borough surveyor. Rebuilding premises, Western Road, for Marks and Spencer (£24,346); Bovis, Ltd., builders.

Bristol.—Flour mill, Avonmouth Dock; Spillers, Ltd. Schools, Upper Horfield (£2,242) and Filton Avenue (£31,924); British Builders, Ltd.

Bromley (KENT).—Senior girls' school, Bromley Common, for the borough E.C.; director of education.

Bucks.—Senior and infants' schools, Slough; director of education, Aylesbury.

Cardiganshire.—School, Bryn, and extensions, Lampeter central school (£6,000); director of education, Lampeter.

Catford.—Billiard hall, Old Bromley Road; A. Frampton.

Cheam.—Presbyterian church; trustees, St. Andrew's.

Chelmsford.—Rebuilding Golden Fleece Inn for Truman, Hanbury & Buxton, Ltd.

Chester-le-Street.—Houses (52) for U.D.C.; W. Ridley, surveyor.

Cranbrook (KENT).—Houses (26) for the R.D.C.; Capt. Lewis, surveyor.

Crowle (LINCS).—Iron ore works; R. Thomas & Co., Ltd., Crowle.

Darlington.—Houses (206); borough surveyor.

Derby.—Schools, Sinfin Estate; E.C.

Derbyshire.—Extensions, Hayfield Poor Law Institution; county architect.

Dewsbury.—Extensions to Technical College, Halifax Road; borough architect.

Dover.—Houses (30); borough engineer.

Durham.—School, Houghton-le-Spring; F. Willey, architect, 34, Old Elvet, Durham.

Eccles.—Houses (47), Monton Estate; F. Speakman.

Epsom.—Flats (28) for U.D.C.; Folshom, Ltd., builders.

Essex.—School, North Romford; county director of education, Chelmsford. Casual wards, Chelmsford and Hornchurch institutions; country architect, Chelmsford. School (£19,739), Hornchurch; Pavitt Bros., Ltd., Aveley, Purfleet.

Eston.—Houses (44) for aged, Grangetown Village Estate; U.D.C. surveyor.

Farnworth.—Houses, North Avenue (44), Daisy Avenue (78), Albert Place, New Bury (26), Westminster Avenue (12); F. Ashton, U.D.C. surveyor, Town Hall.

Gloucester.—Telephone exchange, Barnwood; H.M. Office of Works, King Charles Street, S.W.1.

Great Sankey (WARRINGTON).—Houses (540) and shops, Lingley Green Estate, for the Northern Freehold Estates, Ltd.; Major J. Fraser, The Arcade, Lord Street, Liverpool.

Hamilton (N.B.).—Court house and offices; executive officer, Lanarkshire C.C.

Hampshire.—Boys' school, Fareham (£12,900); County E.C.

Hebburn-on-Tyne.—School for U.D.C.; T. A. Page & Sons, architects, 67, King Street, South Shields.

Hellingly (SUSSEX).—Mills extensions; McDougall, Ltd.

Hornchurch (ESSEX).—Railway hotel (£15,000); Ind, Coope and Co., Ltd., Romford.

Hull.—Houses (112), Barnsley Street Estate (£33,265); F. Bilton. Bus station and central garage; city engineer.

Ilford.—New St. George's Church; the vicar.

Inverness.—Rebuilding Aberlour Orphanage; Alexandra Ross & Son, architects, Queensgate Chambers.

Keighley.—Houses (27), Guard House Road; borough engineer.

Leeds.—Buildings, Knostrop, for sewage works (£9,398); Harold Arnold & Son, Ltd.

Liverpool.—Tenements (240), Speke Road, Barston; land steward and surveyor, Municipal Buildings. Extensions, Quarry Bank (£10,000), Holly Lodge (£10,000), and Queen Mary Schools (£7,000); director of education, Education Offices.

Liversedge (YORKSHIRE).—New Spen Valley Employment Exchange; H.M. Office of Works, King Charles Street, S.W.1.

London.—(CAMBERWELL).—Post office, Camberwell Road; H.M. Office of Works, King Charles Street, S.W.1. (LAMBETH).—Clearance and rehousing scheme; Borough Council and L.C.C. (STREATHAM).—School, Leigham Court Road (£18,500); L.C.C. architect. (TOOTING).—Flats (50), Garratt Lane and Rogers Road (£34,000); Wandsworth borough engineer. (WEST HAM).—Senior school, Custom House, for the R.C. managers; Rev. Charles Carless.

Luton.—Dye works extensions, Old Bedford Road; T. Lye and Sons. Factory extensions; Electrolux, Ltd.

Macclesfield.—Houses (321); borough surveyor.

Maidstone.—Refuse disposal plant (£9,382); borough engineer.

Malvern (WORCS).—Houses (50) for U.D.C.; W. O. Thorp, surveyor.

Mansfield.—Hotel, Ravensdale Estate; Hornby, Ltd. School (£18,000); director of education.

Mansfield Woodhouse.—Reconstruction of Palace Cinema; licensee.

Middlesbrough.—Schools, Brambles Farm Estate, Marton Grove Estate, Whitney Banks, and Longlands; education authority.

Middleton (LANCS).—Houses (60); borough surveyor. School, Boarshaw; director of education.

Newbiggin-by-the-Sea.—Rebuilding of Council's offices; J. Kailofer, surveyor.

Newburn (NORTHUMBERLAND).—Houses (75). Westerhope; David Larmour, 44c, Blackett Street, Newcastle.

Newcastle-upon-Tyne.—Houses (180) for the City Council; M. J. Gleeson, builders, Sheffield. Technical college; F. H. Holford, architect, Town Hall. Extensions to Eye Hospital (£10,000); Newcombe & Newcombe, architects, Eldon Square, Newcastle Avenue. R.C. school; R. Burke, architect, 12, Grey Street.

North Riding.—Hospitals (£40,000); G. Davy, surveyor, County Hall, Northallerton.

Northumberland. — Remodelling girls' school, Hexham (£7,250); County E.C.

Nottingham.—Warehouse and office block, Castle Boulevard; Gilbert & Hall, Ltd., builders, Castle Boulevard.

Orpington (KENT).—Primitive Methodist church; Rev. G. R. Manland.

Otley.—Four shops and offices, Boroughgate; A. T. Smith.

Oxford.—Houses (48), Glebe Estate (£20,228); A. Drew, Cheltenham.

Prescot.—Rebuilding Blue Bell Inn; A. E. Shennan, architect, Liverpool.

Ramsgate.—Schools (£26,615); director of education.

Renfrewshire.—Schools, Ladyburn and Greenock; County E.C.

Retford.—Institution laundry, Poor Law Institution; Notts County architect. Sir Frederick Milner School (£16,490) for T.C.

Rowley Regis (WORCS).—Houses (170) for U.D.C.; Mr. Griffiths, architect.

St. Helen's (LANCS).—Houses (394), Eccleston; borough surveyor.

Salford.—Houses (180), Wheater's Field, and flats (138), Broughton (£76,000); borough engineer.

Salop.—School, Madeley; director of education, Shrewsbury.

Sandbach (CHESHIRE).—Extensions, Brook Silk Mills; G. H. Heath & Co., Ltd., Macclesfield.

Seaton Sluice (NORTHUMBERLAND).—Houses (36) for U.D.C.; A. Doran, surveyor.

Sheffield.—Houses, Woodthorpe Estate (1,000), and Totley Estate (326); city architect. Employment exchange; H.M. Office of Works, King Charles Street, S.W.1.

Sittingbourne (KENT).—Houses (100); U.D.C. surveyor.

Snodland (MAIDSTONE).—Houses (23); Townsend, Hook & Co., Ltd.

Southall.—Fifteen shops and flats, Lady Margaret Road; Property Construction & Development Co., Ltd.

Southborough (KENT).—Houses (32) for the U.D.C.; surveyor.

South Shields.—Flats (96), Egerton Road; J. Paton Watson, borough engineer.

Stevenage (HERTS).—Houses (80); U.D.C. surveyor.

Stirlingshire.—Conversion of Viewforth House, Stirling, into county offices; James Millar, architect.

Stockport.—Houses (500), James Wild & Co. (Estates), Ltd. Houses (202) for the T.C.; Thomas Davies & Son, builders. School, Southwood Road, for Borough E.C.; Arthur Lawton, secretary.

Stockton-on-Tees.—Five years' educational building programme for E.C. (£90,000); J. P. Wakeford, borough engineer, Town Hall.

Sutton-in-Ashfield.—Alterations, King's Cinema; licensee.

Taunton (SOMERSET).—Priory School for the Borough E.C.; Stone & Francis, architects, Lloyds Bank Chambers.

Tenterden (KENT).—Houses (38); R.D.C. surveyor.

Thornaby-on-Tees.—Works; Russian Oil Products, Ltd.

Thornhill (HANTS).—Hotel (£4,000) for Brickwood & Co., Ltd.; Burnett & Sons, architects, Southampton.

Torquay.—Development, Watcombe Park Estate; T. J. Crossman. Extension of Pavilion; borough engineer.

Tynemouth.—School for E.C.; Hayes & Gray, architects, 50, Camden Street, North Shields. Infectious diseases hospital (£19,400); J. L. Beckett, borough engineer, Town Hall.

Uttoxeter.—Houses (100), Park Avenue; U.D.C. surveyor.

Wakefield.—Isolation hospital, Snapethorpe (£71,000); city surveyor.

Wallasey.—School, Gorsedale Road, Poulton (£35,000); E.C.

Ware (HERTS).—Houses (24), Tower Road, for the Workmen's Housing Association, Ltd.; E. A. D. Tanner, architect.

Warwick.—Sewage disposal scheme (£34,600); borough engineer.

Washington (DURHAM).—Houses (28), Heworth Road site; J. Swaddle, engineer, Council Chambers.

Weetslade (NORTHUMBERLAND).—Houses, Seaton Burn and Hazelrigg; H. G. McNaught, surveyor, Council Offices.

West Bromwich.—Houses (125), Dial Lane, Harville Street, and Ebenezer Street; borough engineer. School (800 places), Friar Park; A. O. Chatterley, borough architect.

West Hartlepool.—Houses (64), Leamington Parade; Harland & Parker, builders, Hartlepool. New infants' department and senior department at Throston (£20,000); F. Durkin, borough engineer, Town Hall.

Welwyn Garden City.—Housing scheme for U.D.C.; Geoffrey R. Barnsley, architect.

Whitley Bay (NORTHUMBERLAND).—Development of Garden City for the Briar Dene Estate Co.; W. M. Potts, architect, John Street, Sunderland.

Willenhall (STAFFS).—Re-erection of portion of Denver Works, Morfital Lane; A. Shaw & Co., Ltd.

Woodingdean (SUSSEX).—School for the E.C.

Worcestershire.—Senior schools, Evesham and Cradley; County E.C.